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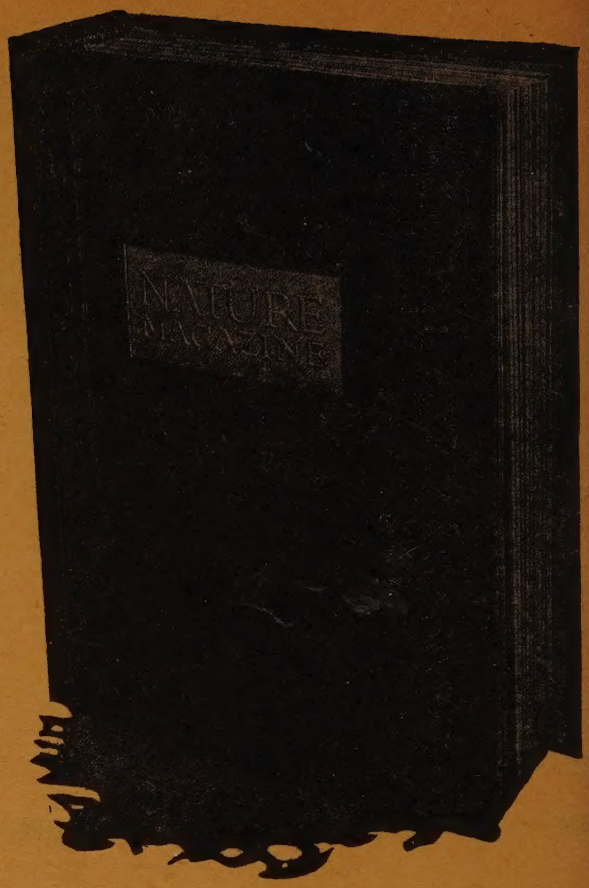

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Foresters To Meet

Resuming annual meetings, interrupted by the war, the Society of American Foresters will gather in Salt Lake City, Utah, September 11 to 14, for a national conference. Call for the meeting has been issued by Shirley W. Allen, president of the society. The session will start on the afternoon of September 11 with special meetings of the Society's eight divisions concerned with forestry education, silviculture, wildlife management, range management, forest economics, forest recreation, forest products and private forestry. An all-day field trip to the well-known Davis County watershed will be held September 13.

A. O. U. Meeting

For the first time since 1942 the American Ornithologists' Union will hold an annual meeting this year. Sessions will be held from September 2 to 5 in Urbana-Champaign, Illinois, with headquarters in the new Illini Union Building of the Universty of Illinois. Regular meetings, banquet, social gatherings and field trips are on the program. The meeting is sponsored by the Department of Zoology and Physiology of the University of Illinois, the Illinois Natural History Survey and the Champaign County Audubon Club. The chairman of the local committee on arrangements is Dr. S. Charles Kendeigh, Vivarium Building, Wright and Healey Streets, Champaign, Illinois. Reservations should be made without delay.

Hawk Mountain Open

After three years away in the service, Maurice Broun has returned to his post of Curator of Hawk Mountain Sanctuary, the new address of which is Route 2, Kempton, Pennsylvania. With his return a post-war program of construction and improvement is being launched, and, for the first time in the twelve-year history of the sanctuary, Hawk Mountain will be open the year around. Mr. and Mrs. Broun hope to make the mountain a Nature center during the summer.

Recording Scenery

During twenty-one years as librarian at Humboldt State College, California, C. Edward Graves had his heart in the mountains. He campaigned constantly for the preservation of the wilderness, and now, having retired, has set out on a project to record through color photography America's outstanding scenic views and natural history subjects. He feels that despite all that conservationists can do to protect park and wilderness areas, these will not be the same a century from now. It is therefore Mr. Graves' aim to record things as they are now, specializing in two-by-two color slides. He lives at Carmel, California.

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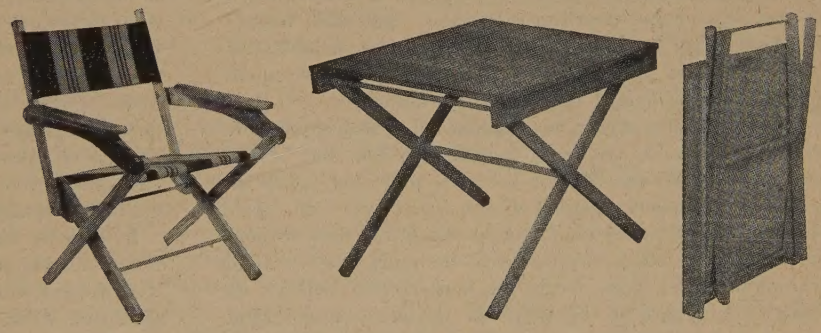

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Nature in Print

By HOWARD ZAHNISER

SON OF THE WILDERNESS: *The Life of John Muir,* by Linnie Marsh Wolfe, has recently been awarded the highly coveted Pulitzer prize for the 1945 "best American biography teaching patriotic and unselfish services to people." Seldom, I believe, have the Pulitzer prize judges, whose annual decisions are awaited with eagerness and much speculation, made a more unexpected or a more meritorious award. None of the many book reviewers throughout the country, who were polled by *The Saturday Review of Literature* before the award, even mentioned *Son of the Wilderness.* The comments after the prize was granted would seem to indicate that the trouble was the book had not been read—a difficulty that the award itself may now be expected to help overcome. When it *is* read, there will be few criticisms that can justly be made of the judges who selected it. There are few men whose life stories make better American biography than this narrative of John Muir, the immigrant boy progressing through hardship from the farm to a national leadership, and, en route, traversing afoot the great scenic areas of the country. There are few men, indeed, who have set a better example of "patriotic and unselfish services to people" than this exemplary conservationist, who not only worked for this cause throughout his life but even sacrificed during his closing years his own personal enterprises to engage in a losing yet strangely victorious struggle to perpetuate a threatened area of the American wilderness. And Mrs. Wolfe's book is worthy of her subject. It is a poignant sadness that she herself did not live to see and hear this final achievement of her life thus acclaimed throughout the nation.

For those who are trying to continue John Muir's patriotic services this book, so unusually heralded in this way to the general public, becomes a great potential help, for surely no one, though previously unaware of the issues that John Muir defined and faced, could read *Son of the Wilderness* without being inspired to enlist in the cause he represented. John Muir himself said: "The battle for conservation will go on endlessly. It is part of the universal warfare between right and wrong." A full generation after his death we are compelled to admit that this still seems true. We can never forever win, yet, persisting, we can never really lose. As Mrs. Wolfe observes, "the battle has gone on relentlessly, every square mile of forest land or scenic beauty having been conserved only after bitter struggle." We can regret and hope to eschew the bitterness, for the acrimonious is never a good savor of righteousness, yet we can never forsake a resolution to resist earnestly the selfish and temporal exploitation of what John Muir called "fountains of life." And we can not only add strength to our own resolves by considering the life and works of this apostle of the outdoors, this son of the wilderness; we can also gain the strength of added numbers by introducing John Muir to those who have not known him. *Son of the Wilderness* is an admirable introduction—a modern gospel according to Linnie Marsh Wolfe.

Nor is such an evangelistic attitude toward John Muir, and a newly-published biography about him, at all inappropriate. He himself declared: "Heaven knows that John Baptist was not more eager to get all his fellow sinners into the Jordan than I to baptize all of mine in the beauty of God's mountains." He introduced his great collection of essays entitled *Our National Parks* with this observation that was at the same time an exhortation: "The tendency nowadays to wander in wildernesses is delightful to see. Thousands of tired, nerve-shaken, overcivilized people are beginning to find out that going to the mountains is going home; that wildness is a necessity; and that mountain parks and reservations are useful not only as fountains of timber and irrigating rivers, but as fountains of life." He was even tempted to compel men to visit these fountains. In *John of the Mountains: The Unpublished Journals of John Muir,* edited by Mrs. Wolfe a decade ago, there occurs, for example, this record: "Pausing in my studies this peaceful afternoon, I chance to think of the thousands needing rest—the weary in soul and limb, toilers in town and plain, dying for want of what these grand old woods can give. . . . Our crude civilization engenders a multitude of wants, and lawgivers are ever at their wits' end devising. The hall and the theatre have been invented, and compulsory education. Why not add compulsory recreation?" It is impossible to read either John Muir or his biographer without being moved to evangelize. I can recall, for example, the decorous restraint that I had to exercise when reading or rather re-reading *Son of the Wilderness* on a Washington street car, I noticed that a young lady beside me was studying a volume entitled *The Neurotic Personality of Our Time,* for I felt that I held in my hand a guide to the answer to the problem that I guessed was being presented to her mind. Who follows in John Muir's train is bound to be at least something of a minor prophet—appealing not only to those who are distressed but especially to those still sound in mind and body. For as Muir observed elsewhere in *John of the Mountains:* "Though Nature in her green, tranquil woods heals and soothes all afflictions, yet their prime uses are not for healing and consolation, but for food for the healthy; and the healthiest robust minds and bodies will enjoy them most."

It is to be hoped that every generation of Americans for a long future to come can have the benefits of a new statement of the life and work of Muir. We are fortunate in the statement that Mrs. Wolfe has phrased for us. About twenty-three years ago William Frederic Badè set an excellent precedent with *The Life and Letters of John Muir.* I have re-read this two-volume work since reading *Son of the Wilderness* and with renewed admiration. It has not been replaced as a clear delineation of Muir; its text of the Muir letters is still invaluable; I would like to see its concluding chapter on "His Public Service" in a school book that all high school students would read. Yet Mrs. Wolfe's is an enriched biography. She has not only written with a fervor that perhaps more truly represents John Muir, and with added details, but she has also succeeded in her central effort to meet the request of Wanda Muir Hanna, who said to Mrs. Wolfe: "Many people know of my father as a naturalist, but the world has never understood him as a man. I wish you would write of him from that

Ridge and Valley

By HERBERT MERRILL

When I walked down the mountain, ironweed
Stood stiff and purple on a brittle stalk,
The goldenrod hung heavy with bright seed,
Blackbirds were bunching in the trees to talk,
And asters painted pastures with their blues.
Blue were the gentians fringing rocky ponds.
The marigolds grew underneath my shoes,
And sumac heads bent scarlet in green fronds.
But in the valley where the sun lay deep,
Summer still slept sprawled in a daisy field.
Summer still tinkled in the bells of sheep,
And summer breathed where drowsy cattle kneeled.
I stood neck deep in summer's green and gold
And saw far off the ridge-line, silver cold.

point of view and tell of his human relationships." With this incentive, with access to new and intimate material, and with diligence in visiting many scenes of Muir's activities, Mrs. Wolfe has revealed John Muir in a fullness not known to readers before and apparently not known to many of his associates either.

"Out of all my garnerings," says Mrs. Wolfe in the course of a summation, "I formed a fairly clear conception of the youth and mature life of John Muir, who with all his planes and contrasts was a strongly individualized, consistent human being. I came to the conclusion that, far from being an effeminate plaster saint, all sweetness and light, as some of his admirers have conceived him, he was in truth red-blooded and intensely masculine; a mystic, yet a realist with his feet on the ground; a lover of solitude, yet gregarious and often a prey to bitter loneliness; frugal in supplying his own needs, but lavishly generous to others; a man of puckish humor and of stern, dour moods. Infinitely gentle and understanding in his friendships, and toward the young, the old, and all defenseless creatures, he was blazingly intolerant of bigotry and every form of social callousness. Although mellowed in maturity and more humorous in his judgments, he was still a fighter, an arch enemy of all encroachments in the name of 'progress' upon human or animal rights. . . . It was John Muir's destiny to lead men back to a realization of their origins as children of nature. 'In God's wildness lies the hope of the world,' he said. He dared to dream of a day, and to work for it, when our Government would cherish this wildness as a perpetual heritage of raw resources for all the people, and a source of healing for body and spirit, and of faculties fostered into fulfillment by intimate communion with the Great Mother."

The greatest service that Mrs. Wolfe's book will render its readers, however, will be realized in leading them to Muir's own writings. Having previously read and re-read all these writings that I know exist in book form, I have still gone through them all again with the new light of *Son of the Wilderness* and with a renewed enjoyment and inspiration. Since the publication of this new biography I have known of others among its readers reading all of John Muir for the first time with the satisfaction and rewards of much new information and rising spirits. That, I believe, is the most sincere testimony to the worth of a biography of a great writer. I recall writing in these pages in 1938: "It will be a sorry time if the pressure of current writings ever forces John Muir from the attention of American readers." It is indeed a happy time now to see a current Pulitzer prize winner calling renewed attention to these writings, and it should be a great pleasure for all conservationists to help see that its readers are multiplied again and again.

Son of the Wilderness: The Life of John Muir. By Linnie Marsh Wolfe. New York: Alfred A. Knopf. 1945. 348 pp., plus preface, bibliography, notes, index and 45 illustrations on 29 plates, including folded-in facsimile of a John Muir letter with marginal drawings. $3.50.

Bird Field Book

Field Book of Eastern Birds. By Leon Augustus Hausman. New York. 1946. G. P. Putnam's Sons. 659 pages. Illustrated in color and black and white by Jacob Bates Abbott. $3.75.

This is a completely new addition to the group of books gathered together in Putnams' Nature Field Books series, and, in these days of scarcity of identification texts, is a particularly welcome volume. There are six plates in full color containing ninety-four birds or bird heads, and more than four hundred black and white drawings, each appearing in juxtaposition to the descriptive text about the birds. Dr. Hausman varies his keys, using dominant color and size as the basis for identification of birds commonly seen around the home, for example, flight habits with the birds of prey, usual habitat for the shore and marsh birds, size with the woodpeckers, and so on. One could wish, of course, for more color plates, and we are not altogether sure that the device of supplying just the heads in color, as with the woodpeckers, vireos, sparrows and ducks, is too happy. Nevertheless, this book will be welcomed by those who wish to identify birds afield, and there is certainly ample demand for it. R. W. W.

Camera in Canada

Outdoors with a Camera in Canada. By Dan McCowan. New York. 1946. The Macmillan Company. 102 pages. 46 illustrations. $2.50.

From the vantage point of the Canadian Rockies, Dan McCowan has for many years been writing about the world of the wild that he finds there, and he has been photographing the outdoors as well. In his foreword to this volume the naturalist writes: "I shall be glad if this book provides you with a passport to an enchanted realm, to an orderly kingdom of great beauty and of infinite peace. There amidst singing birds and fragrant flowers you may have the good fortune to find a pleasant trail which winds gently through green meadows and beside quiet waters." Mr. McCowan provides this "passport" by means of forty-six full-page pictures of birds, mammals, trees and flowers, and correlative text describing them. Like all passports, this book admits one to the country; from then on one is on his own, seeking many more things of beauty than such a small volume can provide by way of introductory acquaintance.

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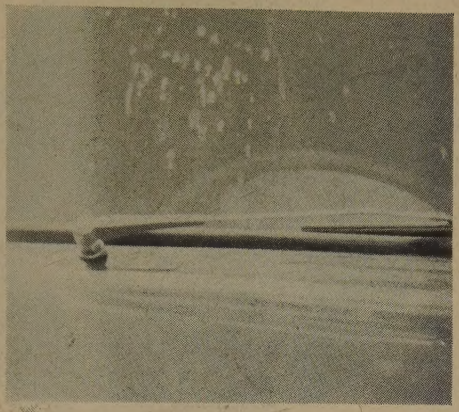
"Getting the Hornet"

By P. L. BROWNELL

I THOUGHT that some of our little feathered friends were "giving me the bird." Time after time, when I took the car out of the garage in the morning, the windshield was covered, always in one large spot or streak.

I investigated, but could see no bird nest above the windshield, or anything on which birds could squat. But, in looking for the



method used by the birds in treating my car in such an unsportsmanlike manner, I discovered something else. It was a small hornets' nest, clear up against the ridge board.

I felt sure that I had the answer. To make certain, I removed the hornets' nest. Sure enough, no more streaked-up windshield. Instead of "getting the bird," I had been "getting the hornet."

★

Splitting Hairs

By C. E. GAPEN

IF A PLANT has anything that resembles hairs or bristles, down or fuzz, threads or spines, the botanist not only has a name for it but also for its particular degree of hairiness, bristliness, downiness, fuzziness—or the lack of it. I do not know who can split them finer; possibly the mammalogist, but I doubt it. In the plant world, evidently there are more gradations from thistledown up to bristle than in the animal world from bristle down.

If you have held a burdock leaf between your thumb and forefinger, noted the bloom on the skin of a plum, or collected a fingerfull of cactus spicules, you may enjoy testing your botanical prowess on this list of twenty-four. The brief definitions in the lettered list show what a fine line can be drawn between hairs, or between a hair and no hair. Twenty right out of the list indicates a good head for hair; fewer than fifteen is a bit thin. Page 383 for answers.

What the Botanist Says	What the Botanist Means
1 aculeate	a coated with soft slender hairs.
2 puberulent	b with coarse beardlike hairs.
3 hoary	c with extra fine downy hairs.
4 ciliate	d with eyelashlike hairs on the edge.
5 glaucous	e covered with powdery granules. (Don't get technical. Maybe they're not hairs.)
6 lepidote	f with loose woolly tufts.
7 floccose	g beset with prickles.
8 hirsute	h covered with bluish or whitish bloom that rubs off.
9 hispidulous	i well covered with very small upstanding bristles.
10 plumose	j grayish white like the dusty miller.
11 pulverulent	k with scurfy scales like silverberry leaves.
12 pilose	l hairs on each side like the plume of a feather.
13 strigose	m with a close coat of soft straight silky hairs.
14 barbulate	n bearded.
15 comose	o with a tuft of soft hairs.
16 barbate	p covered with very small nipplelike protuberances.
17 glabrous	q chaffy with minute scales.
18 hispid	r covered with rigid hairs pressed down.
19 lanate	s with a very fine beard.
20 papillose	t coated with rough bristlelike hairs.
21 sericeous	u covered densely with soft entangled hairs—woolly.
22 squamellate	v with a coat of long weak hairs—shaggy.
23 tomentose	w with a dense woollike mat.
24 villous	x bald.

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Speaking of Citations

Next time you call or visit a telephone office, see if you don't think the young women working there deserve a citation for competence and courtesy. They are doing a fine job.

Demand for telephone service is at an all-time high. That means more calls to put through—more telephones to install—more bills to prepare and send out—more people to talk with in the business office . . . and more equipment needed to do the job the way we would like to do it.

We're building and adding just as fast as we can get materials and make equipment. In the meanwhile, telephone people who serve you will keep right on doing their best.

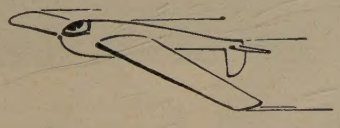
And doing it with a friendly smile.

BELL TELEPHONE SYSTEM

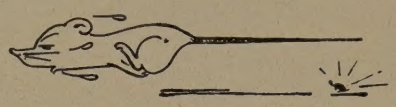
Contents Noted

DAVID ROTBART, Washington, D. C., grocer, was studying nebulae and clusters—as a relief, no doubt, from telling customers there was no butter and little bread—when he spotted a new comet. This find was immediately reported to the United States Naval Observatory, which gave it confirmation. Mr. Rotbart was recorded by the press to have taken it all very calmly, and was not in the least upset when word came from Copenhagen, Denmark, that a European astronomer named Pajdunakov has simultaneously made the discovery. In astronomical circles the name of the discoverer is attached to such newly-observed celestial bodies, assuring a measure of immortality, and the new comet will probably bear the name Comet Pajdunakov-Rotbart. Perhaps, if men can amicably share such a dashing dot of the outer firmament, there is some faint hope that they might, with equal peace, share this infinitesimal Earth of ours.

BEFORE Pearl Harbor research men for Gulf Oil Corporation were at work on a magnetic detector that could be made to operate when airborne. With the war this instrument became the "flying eye," able to "look" beneath the surface of the sea and "see" enemy submarines lurking there. It was a valuable aid in winning the war against the U-boat. Now the instrument, called a magnetometer, is being used to prospect for oil from the air. It records on a grid the presence of highly-magnetized basement, or igneous rock, indicating probability of oil-bearing formations. Electronically operated, the gadget travels in a bomb-like casing trailed beneath a plane to eliminate magnetic interference. Being airborne, it can cover in a few hours territory that would require long and tedious prospecting on the ground. And it operates over water, beneath the surface of which much oil-bearing formation exists. Thus are Earth's secrets wrested from her.



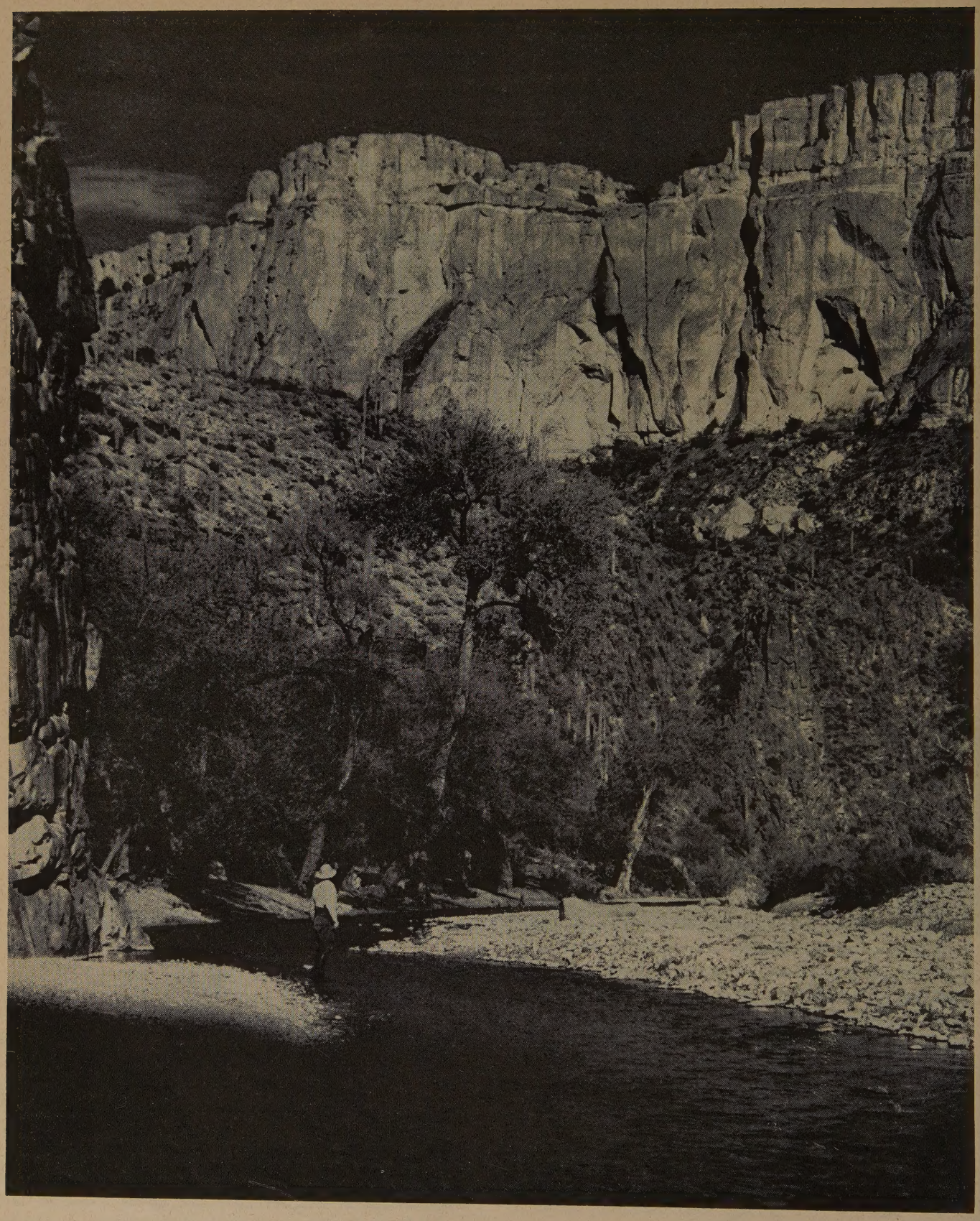
OUR DOG, who really is not much of a dog, but we like him, recently developed into a sort of tick hatchery. After he had been carted off to the vet for proper attention, we went into the matter of ticks, which are getting to be more and more prevalent and troublesome. One thing that we discovered, and which is worthy of thought for its even broader significance, is how man brings more ticks into being. These devilish little animals must have a host to survive. Small mammals, mostly rodents, are the first and most frequent such hosts. Man in his ignorance, or from some misbegotten notion that he is practising conservation, kills off coyotes, foxes, hawks, owls and other predators that Nature provided to keep rodents in check. Result: More hosts for more ticks to prosper upon and thus increase their kind. Further result: More ticks to infest domestic animals and increase human danger of spotted fever and tularemia. End result: More business for the veterinarian, exterminating company, the doctor and the undertaker.



FOR SOME months now our booklet, *Birds of the States*, has been out of print. It was rather dated, anyway, although it gave pictures and information about the official avian emblems. So we set to work planning another booklet to be called, perhaps, *Nature Emblems of the States*, and to include colored pictures of all of the State Flowers and other Nature emblems. It would be a valuable publication, informationally and educationally. But—and it is quite a big, upper-case BUT—it would be expensive to reproduce in the way it should be done, and to distribute at as modest price as possible so that it could do the most good. Such a booklet needs an "angel," someone willing to set up a special endowment to make the publication possible on an entirely non-commercial basis. If you know any public-spirited angels, let us know.

"WANTED: a new word; 'conservation' is lofty, long and deadening," says a recent *Sierra Club Bulletin*. "We're in favor of what it means, but there are too many syllables in it. It's a little too musty." There is much in this thought. "Conservation" is now a word that takes in a lot of territory; a lot of subjects that do not belong under its shadow have found shelter there. But we have not heard a better one, and doubt that the substitute tentatively suggested by David R. Brower of the Sierra Club quite fills the bill, although it has the merit of a fresh phrase. He urges true conservationists "to stop the fall of the wild." The wild things and the wild places, he says, have given millions a lift; let's give them a lift, too.

R. W. W.



In the paradise of Aravaipa Canyon. Between its flaming, stupendous walls a crystal stream had gashed a red gorge across The Tablelands of what is now Pinal County.

"Islands" of the Desert

By JOHN LINDSEY BLACKFORD

Photographs by the Author

THE PASSIONATE, inexpressibly poignant choiring of a hermit thrush grew vibrant on the fragrant air. So illusively did the first notes penetrate the forest silences, so completely did the ecstatic song cast its magic spell, that it was a long moment before awareness of it jarred the senses. An Audubon hermit singing here—on the rim of Grand Canyon. How could it be?

Southward only a hundred yards through sun-patterned, russet-columned boles of the open yellow pine park ran the jagged rimrock, abrupt brink of that arid abyss. Eastward stretched the sterile desert of the Little Colorado; and westward, miles away beyond the Hurricane Cliffs, the baked, jumbled ranges and basins of the Mojave. From the north, after leaving behind the bright Vermilion Cliffs of Utah, the car had climbed steadily out of a wide, parched depression up into juniper and pinyon; and next, with the feeling that I had found God's Country again, we had attained the yellow pines. The road mounted gradually among them, then leveled off on their needled, sunny floor. And finally the machine rolled almost imperceptibly downward for speeding miles toward the Canyon's spectacular rim.

It was the familiar story of life zones, of course. But theories and classifications do not well prepare one for exciting realities. A few Douglas firs strode with the pines as they marched majestically back from the rim. Firs, too, crowded where the gorge of Bright Angel Creek clove the plateau; and silvery aspen clumped not far off about subsurface moisture and seepage springs. Far back, toward the broad crest of the tableland, spruce and alpine fir mingled with the aspen's shimmering groves; and now I recalled that in winter six feet of snow lay deep upon the North Rim. This Kaibab, where a northern chorister sang rapturously from hidden depths of fir, was a mighty, upfaulted plateau—a vast, green "island" of the desert sky!

It was June. Among the massive, scaly-plated, rust-red trunks of the ponderosa pines, thorny locusts flaunted another anomaly. Their showy, white or lavender, wisteria and sweet-pea-like blossoms startled the eye. Here were trees delicately flowering a conifer wood, scenting the piny air with even more redolent and seductive perfume!

Everywhere around this exotic land spread the desert. In dizzy Lower Sonoran depths below flourished catclaw, mesquite and yucca. Even Joshua trees fantastically rimmed the neighboring Mojave. Yet up on the dome of the Kaibab, Engelmann spruce and alpine fir told of the high Canadian Zone. And from its cool borders, down blooming, sun-bathed aisles of the Transition forest, rang the ecstasy of the silver-tongued mountain thrush. There, too, a white-tailed, tuft-eared squirrel was running away with my lunch!

Far southward in Arizona, thrust up from still thirstier deserts, rose green-capped ranges. Scorched mesas and bajadas between were cleft by verdurous canyons; and threading across the dazzling valley-basins, ribbons of silver coursed between leafy bowers of beckoning green. Only by visioning them as floral

A youthful Abert towhee, whose parents, perhaps, came noisily to shuffle fallen leaves, as they shifted and searched the dry floor-cover of the woods.

"islands" of the desert might one prepare the mind to grasp the contrasts waiting there in the empire of the sun.

Memorable among those verdant refuges, in the domain of stately saguaro and green-skinned palo verde, is the paradise of Aravaipa Canyon. Between its flaming, stupendous walls I waded the crystal stream that had gashed a red gorge across The Tablelands of Pinal County. Desert ash, Fremont cottonwood, and southwestern sycamore leaned above the rippling coolness of the creek; willows bowered the bouldered windings of the brook. Bright birds flashed gaudily amidst the shining green. A constant chorus of cardinals, phainopeplas, doves, warblers and racketing Gila woodpeckers filled the depths of the canyon, and gave gay accompaniment to the tinkle and splash of the stream.

Had I really come through the miles of blistering heat, of furnace-like washes and dry river beds, of treacherous cholla, barren creosote and prickly pear? From above the crowns of the cottonwoods was signaled the answer. High on inner slopes of the canyon giant saguaros had long ago staked out their claims. This land, they testified, belonged to the desert. This deep-hidden, winding oasis of green was but the final flowering of the wastes. Dizzily atop Aravaipa's sheer, bright walls, stretching away across the roof of The Tablelands, I would find again the far cactus reaches, the quivering, heat-cursed distances of the mesas. Where else save in such islands of the desert might one glimpse the jaunty, black crests of phainopeplas? Or thrill to the raucous cooing of white-winged doves?

Endlessly, from wall to wall, from pebbled beach to cliff and back, I crossed and recrossed the sparkling stream. The startling blood-red of a vermilion flycatcher blazed as he darted out from shaded seclusion. Mighty sandstone precipices swung close in and back. The intense blue sky appeared to hang on needled peaks and creviced rim, save when some fleecy cloud-sheet wedged briefly in between. Yucca climbed the brick-red talus slopes with mountain mahogany and cliff rose, and clung in joints and splintered columns of the cliffs. Then, at a swift turning of the creek, a band-tailed Mexican black hawk sprang into the air from his batrachian dining by the water's edge, and swung in swirling flight above the broad-crowned cottonwoods. His sable sweep against the red cliffs and the dazzling blue, over the glistening green, above the glinting channel, seemed to portray, in ways that words could not, the contrasts and the splendor of the painted gorge. Here, between narrowed cliffs, was islanded a supreme wonder of the desert.

Lingering in golden sunlight, on the shade-patched floor of broad, evergreen oaklands mantling gentle slopes of the Santa Ritas, I found another unique oasis of the desert. Peopling this encinal wood, whose dwarfish groves descended from foothill strongholds to make savanna-like contact with the arid grassland, was a most elfin community of birdfolk. Down the first oak-clad ravine sifted a band of tiny bushtits. They were definitely preoccupied with midget business. For an intruder they had scarcely more than a bright peek, and a sharp twitter that was half carried away with them as they hustled on to the next clump of silk-tassel and scraggly mesquite beside the dry wash. Here a pair of diminutive western gnatcatchers flipped vivaciously through the thorny scrub. As often, they flitted into low branches of the pigmy acorn-bearers, and whipped about in unending excitement amid the shiny, varnished leaves. Their long,

Beyond the foothill slopes of the Santa Ritas, from arid plains, rose far, inviting ranges—the Mustangs, Whetstones and Huachucas — other oak-clad, sun-bathed "islands" of the desert.

gnatcatcher tails twitched like animated exclamation marks, white-trimmed outer feathers flashing at all angles.

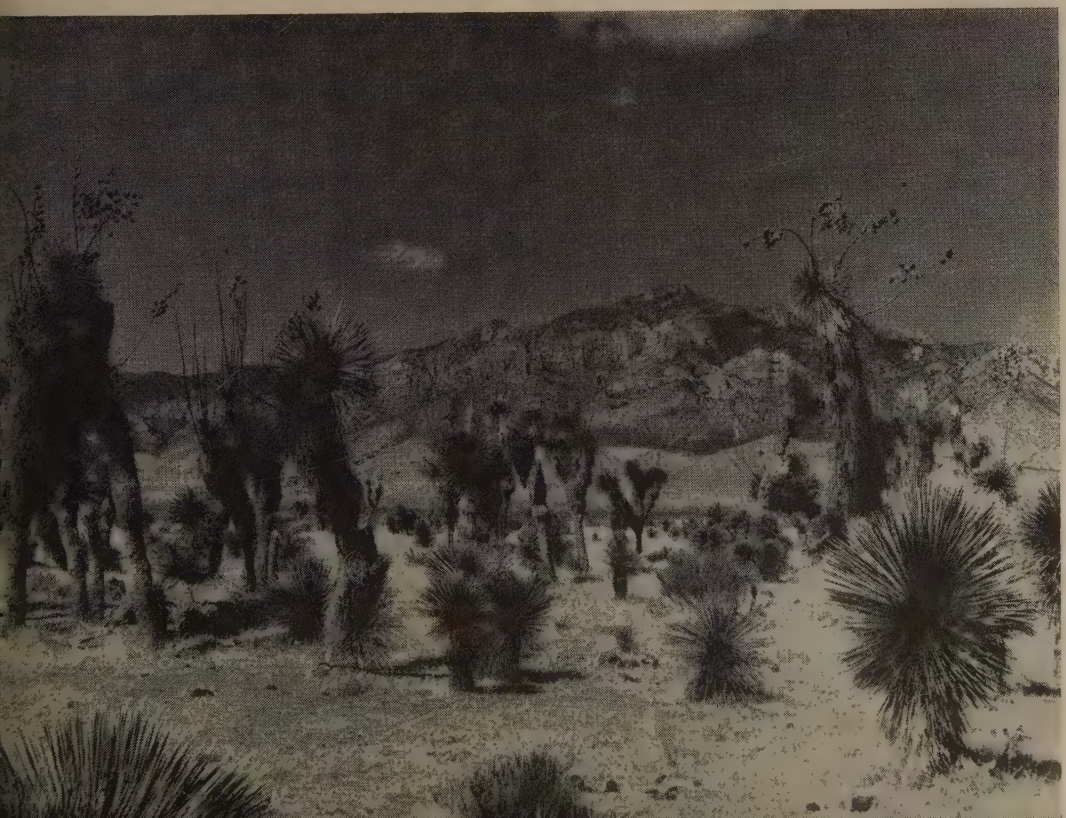
In a hidden vale of the low range, sunbeams glowed effulgently in leafy crowns, and shot long aureate shafts among gnarled limbs of the live oaks. Here I caught the talkative approach of those famous feathered midgets of the evergreen oak belt, the bridled titmice. Their acrobatic troop, in company of other sharp-eyed mites, the tufted gray titmice, came swinging and romping through the treetops. Suddenly I seemed to be at the center of a sportive band of these little crested woodsmen. They quickly infiltrated the arching boughs overhead. Several bridled titmice, tufted crowns and striking black-and-white facial markings giving them a puckish air, leaned far down from this vantage to peer with undisguised curiosity. A querulous note, apparently a remark upon the absurdity of this unfeathered visitor, passed between them. Then, with unmistakable chickadee inflections in their friendly parting conversation, they drifted more quietly into a neighboring nut pine.

Two cinnamon-brown Abert towhees came noisily to shuffle fallen leaves, as they shifted and searched the dry floor-cover of the woods. A dull-blue, gray-backed Woodhouse jay, gliding down the slope, authoritatively squawked disapproval in his passing inspection of the grove. Small, olive-gray Stephen's vireo sings his strange, mewing notes in these Upper Sonoran aisles, although just now I did not hear him.

Late afternoon sun lengthened scattered, lazy shadows. Still the dwarfish forest was wrapped in pleasant warmth, and one's thoughts in dreams. This idyllic summer hour seemed prophetic of autumn; then rollicking pygmy nuthatches, Mexican creepers, and soft-voiced warblers would descend from higher, pine-clad ranges to revel with the merry flocks of elfish titmice and lead-colored bush-tits. Sometimes, hundreds together, they frolic in the hospitable live-oak lands of the Santa Ritas. Even rare brown-backed, spot-breasted Arizona woodpeckers might be met with in small, sociable companies in these southern ranges. But now the jovial racketing of an acorn woodpecker aroused me. Perhaps he, too, was anticipating that promised season of plenty in the live oak groves, when bountiful mast would set him a-gathering his winter hoard. As I wandered reluctantly down through the alluring woodland, a panoramic view of the desert opened before me. Beyond the oak-dotted flanks of the Empire Range, beyond the green foothill slopes of the Santa Ritas, rising from flat, arid plains like steep-walled isles from a gray sea, rose far, inviting ranges—the Mustangs, Whetstones and Huachucas—other oak-clad, sun-bathed "islands" of the desert.

Where the thirsty Hassayampa winds southward between shimmering cholla flats and parched, ocotillo-studded benches towards the Gila, it keeps close beside itself on either bank bordering bowers of refreshing green. Even where the river's bed becomes a broad, sandy wash, abandoned by surface waters, or where only a transient rill defies the heated pebbles to meander back and forth across 200 yards of glaring gravel, tall cottonwoods, feathery-leaved mesquite, sandbar willows and dense arrowweed line the curving stream-course. However few one's steps beneath the verdant broadleafs, in spring such an experience becomes an adventure in kaleidoscopic color and sound.

Within these narrow gardens, Arizona cardinals flash in brilliant rivalry with vermilion flycatchers and



From bayonet-bladed "forests" of tree yucca straying across arid New Mexican grasslands, the Chiricahuas rise in isolated beauty and wonder. Mexico itself is within sight of their summits.

rose-red Cooper's summer tanagers. Golden-winged gilded flickers riot in the high, leafy canopy or stride raucously up great furrowed trunks. With hammering of Gila woodpeckers, their excited drumming throbs in the groves; and the high clamor of both flings a racketing pattern of strangely thrilling cries against the low, harsh, yet oddly pleasant cooing of the white-winged doves. Glossy, black phainopeplas dart out above the dazzling wash, seize insect prey with flycatcher precision, and return with a flash of white wing bars. Bullock orioles come to add clear piping, discordant chatter and rollicking song to a carnival made scintillant with their flaming red-orange and jet black.

In late April I crept into the arrowweed in pursuit of a spirited, intermittent song. A large bird, with amazingly decurved, sickle bill and bright, chestnut-colored undertail coverts, clung high on a swaying stem. Once this feathered opportunist apparently deserted hot plains and desert kin for the lush tangles of cottonwood borders—my sweet musician was a shy crissal thrasher, first cousin to many lyric-throated dwellers of the cactus flats.

Out on the arid wash my appearance was assailed by shrill cries of *cry-baby, cry-baby—baby—babeee.* "Cry-baby yourself," I protested, noting the fast sprint of the noisy killdeer upriverward. Turning downstream, while the alarmist stopped with head perilously a-jerk, I searched the beach, then combed it carefully again. At the point of a gravel bar four light, clay-colored eggs, heavily splotched with dark sepia-brown, revealed the plover's ambitions. Only a stone's toss beyond the thin cottonwood, spiny cane cactuses, leafless palo verde, and bulky bisnaga battled with the wasteland's suffocating drought. What secret enchantment of this glaring ribbon of sand, between parallel rows of fragile green, lured shore birds into the desert?

Where mesquite advanced from the Hassayampa's cottonwooded bank off into fiercely armed ranks of golden-spined jumping cholla, I dodged through the tangled thorn. Abruptly, with explosive thunder of wings, a desert or Gambel's quail burst from tall, withered grass stems at my feet. Before I could halt, I had stepped over a tiny "hut" of arched grasses. Turning, I carefully drew back the thatch of dead, weathered blades, and uncovered the quail's hidden treasure, a clutch of twenty speckled eggs. Quickly my camera recorded the creamy ovals, so variously dotted and clouded with lavender-brown. Scarcely had the upper layer been turned in the nest-hollow, so as to present their different markings to a second film, when one egg stirred somewhat in the manner of an oversized jumping bean, and I stared fascinated at a circular crack widening from a new-made pip in its shell. After all those tedious weeks of incubation I had come at the magic moment of emergence of the baby quail!

With astonishing alacrity they neatly uncapped the creamy eggs. Soon striped, fuzzy first-comers were intent upon exploration of the weedy maze beyond the nest rim, while the last damp youngsters clambered from encumbering shells. After many frustrations the lively twenty were gathered together in their grassy cradle. Hastily, with a fast flicker of the shutter, I snatched the picture, then drew the disguising canopy of grass stems over the babes. Farther on came discovery of two pure-white eggs of a mourning dove. Negligently cradled on a thin twig-mat, the frail pair rested precariously on the creviced, rough-barked, horizontal arm of an alamo. Intriguing, this dissimilarity in nest protection, yet in keeping with countless other contrasts of a desert refuge. Returning through the thorny mesquite thicket, I peeked with glasses from a distance under the obscure thatch of the quail's hut. The old bird was hovering her precocious chicks and having none of my difficulties.

From burning, mescal - studded ridges, from bayonet-bladed "forests" of tree yucca straying across arid New Mexican grasslands, from mesquite plains of southeastern Arizona, the Chiricahuas rise in isolated beauty and wonder. Although the azure flash of Arizona jays and the infectious merriment of bridled titmice must always recall them, it is the floral marvel hidden in these mountains that we remember. The "Chiricows" claim the second most varied flora north of the border; Mexico itself is within sight of their summits.

Close upon streamside sycamores in the tree-choked canyons press live oaks and Arizona cypress. Arizona yellow pine, bearing long, plume-like needle-tresses, invades their stands with Chiricahua and Apache pine. And in these depths, scattered even among the dapple-trunked sycamores, grow tree yuccas. A few hundred feet away, in hillside parks of the dwarf oaks, agaves spread great saw-edged leaf-spikes, and mescal rockets tall flower-stalks above the low woodland crown. In Chiricahua's exotic forests one can hope some time to see the black, geranium-red and bronzy-green, coppery-tailed trogon, or the green, carmine-crowned, thick-billed parrot. Like equatorial atolls of the trade-wind seas many of the Southwest's plateaus, canyons, and mountain ranges are lovely, verdant paradises, islanded in the desert.

A Plagiarist

By M. PASCAL

High in the boughs of a tall cypress swinging,
Blending his form with the shadows,

A mockingbird drank in the song of the lark,
And sang it at dawn to the meadows.

Photograph, taken with two lenses, of lightning striking the Empire State Building. Center is stroke to top of building recorded by stationary lens, and is a composite of the complete lightning charge. Around the circumference of the picture are a multitude of different strokes taken with a rotating lens. They are components of the complete discharge shown in the center. The stroke begins at the lower left-hand corner as a continuing discharge; that is, a rather low current, long duration current flow beginning at the building and progressing toward the cloud. This is later followed by a number of current peaks seen at the upper part of the picture.

PHOTOGRAPH FROM GENERAL ELECTRIC COMPANY

Lightning—from Myth to Meteorology

By EDNA H. EVANS

DO YOU suffer from astraphobia? Are you subject to spine-chilling, diaphragm-paralyzing fits of keraunophobia?

It is no fun to be thus afflicted, but you have plenty of company, including the author of this article—who has queried several psychologists just to find the name of the thing that makes her feel so uncomfortable when the lightning flashes and the thunder booms.

Astraphobia, the psychologists said, is "anxiety amounting to terror during thunderstorms." Keraunophobia is "morbid fear of lightning." And there you are.

Lightning, the author will readily admit, is beautiful stuff—when viewed from a distance. But when the flashes come close enough to make the fuse box on the back porch crackle, when the thunder crashes and then goes rolling off in search of more eardrums to conquer, when people say, "Cheer up, if it hits you, you'll never know it," then is the time the writer yearns for a nice bombproof shelter, a quiet cyclone cellar, or a cozy padded cell.

In a world so recently torn by high explosives and over which hangs the threat of the atom bomb, fear of thunder and lightning seems utterly ridiculous. But the age of the atom bomb can be measured in months, and the age of high explosives by a comparatively few score years. Thunder and lightning, on the other hand, are age-old, and man has feared and respected them since the time his mind first grasped their potentialities.

Thunder and lightning are two of the most awe-inspiring aspects of Nature, and possibly the most universal. A man may never see a tornado, may never experience a flood, an earthquake or a hurricane. But all people, unless they live in the relatively small areas on earth where thunderstorms are rare, are acquainted with thunder and lightning.

For this reason it is not surprising that early man always attributed lightning to his chief god, or at least ascribed its control to a deity ranking high in his own particular pantheon. Primitive man feared and respected lightning, thus he associated it with a high god and paid homage to that god accordingly. In the course of time he forgot which commanded his first respect—the god or the lightning.

Egypt, being a country of heat and sunlight, had little experience with lightning. But when a rare

electrical storm did occur in the kingdom of the Nile, the priesthood made it clear to the people that the gods were angry.

The Bible tells how lightning and hailstorms did visit Egypt when Moses was trying to secure the release of the Children of Israel. The Hebrews themselves were well acquainted with electrical storms, and thunder and lightning are mentioned frequently in both the Old and New Testaments. Palestine is a land of mountains and gorges, split lengthwise by the cleft of the Jordan, and the effect of thunder there is most spectacular, especially during the winter season. Jehovah spoke in thunder and sent forth lightning to show His wrath. When he was overthrown "Satan fell as lightning from heaven."

The Greeks gave control of lightning to their chief god, Zeus, and their legends tell how he used the thunderbolt to punish erring or presumptuous mortals. Jupiter, the Roman counterpart of Zeus, also ruled the lightning. The Latin peoples considered the oak tree sacred to their chief god because it was the one most often struck by lightning.

The Druids of Germany and Britain carried their reverence of lightning farther. To them the mistletoe plant was sacred because it grew on oak trees and was thought to have been created by lightning.

Scandinavian peoples gave thunder and lightning to their god Thor, who was not supreme, but who ranked high in the realm of the gods. The lightning flash, they believed, resulted when Thor hurled his hammer at his enemies, while thunder was the sound of his brazen chariot wheels. In India the god Indra, who ranked next to the top triad, had control of the heavens, and of thunder, lightning, storm and rain.

The New World peoples also respected thunder and lightning and considered them to be controlled by various gods. The Incas of Peru had a special rain-and-thunder god, while other Indian peoples paid homage to the thunder-bird, the lightning-serpent and other supernatural beings. The Aztecs connected lightning with their rain god, Tlaloc, and set aside a special heaven for people who were drowned, or killed by lightning. This particular afterworld was a land of peace and plenty, not quite as high as the realm of the sun where warriors went, but much nicer than the common afterworld reserved for ordinary souls.

Throughout the Middle Ages lightning continued to be a thing of mystery, to be feared and avoided by charms and incantations whenever possible. As a heritage from the Druids, mistletoe was considered to be a charm against lightning, as were the ashes and charred sticks saved from the Yule fire, Easter fire, Midsummer Eve bonfire and others kindled at various times during the year.

U. S. FOREST SERVICE PHOTOGRAPH

This photograph was taken thirty seconds after lightning had struck a western yellow pine near the Director's house at the Southwestern Forest Experiment Station.

Somehow, during the centuries, people got confused as to whether lightning was controlled by the highest god or the wickedest one. Thus developed the idea that thunder and lightning were caused by the Devil's servants —a belief that continued into the American colonial period, when harmless old women were burned as witches. Shakespeare made frequent use of his trio of witches to set the tone for *Macbeth*, opening with the witch's question: "Where shall we three meet again, in thunder, lightning or in rain?" Whenever the witches appeared, they did so to the accompaniment of offstage thunder and lightning, which probably kept the property man busy.

Thus, until a comparatively few years ago, lightning continued to be a thing of wonder, awe and supernatural origin. As late as the close of the seventeenth century a leading English scholar described lightning as an explosion of "nitrous and sulphorous vapors" in the air, similar to the firing of gunpowder.

But, as scientists became better acquainted with electricity, they began to suspect that lightning and electricity were one and the same. America's Benjamin Franklin suggested this idea first in 1749 when he pointed out twelve similarities between electricity and lightning. "Electrical fluid," Franklin wrote, "agrees with lightning in these particulars: 1. Giving light. 2. Color of the light. 3. Crooked direction. 4. Swift motion. 5. Being conducted by metals. 6. Crack or noise in exploding. 7. Subsisting in ice or water.

8. Rending bodies it passes through. 9. Destroying animals. 10. Melting metals. 11. Firing inflammable substances. 12. Sulphureous smell."

Franklin continued that "the electric fluid is attracted by points", and added: "We do not know whether this property is in lightning. But since they agree in all particulars wherein we can compare

them, is it not probable that they agree likewise in this? Let the experiment be made."

A few weeks later Franklin made his first suggestion as to the use of a lightning rod whereby "the electrical fire would be drawn out of a cloud silently before it could come near enough to strike." He made further suggestions concerning the way to test lightning, and his theories were proved by experiments of French scientists in 1752. But, before he received word of this success, Franklin had proved the same thing himself by his now famous kite experiment. Fortunately, his kite did not contact a heavy bolt—otherwise his successful experiment also might have been a fatal one.

As a result of these experiments lightning rods were used to protect homes and barns, although some people wondered whether such methods of circumventing divine wrath showed a lack of faith. A Baptist pastor friend of Franklin made a special point of explaining that the use of lightning rods was neither presumptuous nor had it any irreligious aspects.

Franklin did not attempt to patent the lightning rod, nor did he gain profit from it. He was willing to contribute his findings to science, and the personal satisfaction he gained in answering his own questions apparently was reward enough.

Until the middle of the last century no one knew exactly what lightning looked like. From the days when Zeus and Jupiter were shown holding the thunderbolt, lightning had been represented as zigzag streaks with sharp angles. It is still represented that way in conventional designs. However, photographs show that lightning actually is never angular, but is always more or less sinuous, like a meandering river, and that it often has many branches.

Man's ideas have changed markedly since the days when he thought the gods hurled lightning like spears and caused thunder by driving their metal chariots across the sky. Today, lightning has been reduced to a mere electrical unbalance, resulting when a preponderance of positive electrical charges accumulate at one place while a preponderance of negative charges accumulate somewhere else. This hap-

A thunderstorm is building up in the picture at the left, and, below, it has arrived over the Mount Baker National Forest, Washington, putting on this display, as observed at the ranger station.

pens with the formation of thunderclouds, when strong upward air currents carry positive charges to the top of the cloud, while negative charges accumulate in the lower regions of the cloud. Meanwhile, positive charges are attracted to the earth's surface just below the cloud, and, when the unbalance becomes too great, lightning results. Kipling referred

to lightning as the time when "the heavens balance their volt accounts."

As for thunder—its cause is not nearly as spectacular as the old chariot wheel theory. Its modern explanation is simple. The air in the path of a lightning flash is heated and expands rapidly. Then, as the heated air cools and begins to contract, more air rushes in to fill the space, and the resulting disturbance smites the ear as sharp or rolling thunder.

Most lightning flashes are from cloud to cloud and only a small percentage of the total reaches the earth. Cloud-to-cloud spark channels may be five to ten miles long or longer, while those to the ground may be four or five miles long.

Lightning is not a rare thing. Scientists have estimated that 44,000 thunderstorms occur on the earth every day, with some 360,000 lightning flashes an hour. The strokes travel at a speed of about 20,000 miles a second. One investigator, F. W. Peek, Jr., of General Electric Company, has assigned the following values to an average bolt of lightning: voltage, 100,000,000; current, 100,000 amperes; energy, four kilowatt-hours; time, a few millionths of a second.

Greatest number of lightning flashes per storm was reported by the Buffalo Niagara Electric Company's lightning recorder during a 44-minute midnight thunderstorm June 29 and 30, 1945. During that time 354 lightning flashes were recorded, an average of eight a minute for the entire period.

PHOTOGRAPH FROM GENERAL ELECTRIC COMPANY

An artificial fulgurite made by an artificially lengthened discharge. This greatly resembles the natural fulgurite in all details. For more about these formations see page 360.

Scientists have learned many things about lightning, but they can neither control it nor anticipate the exact place it will strike. Despite its great power, scientists have no illusions of harnessing lightning and putting it to work. Its occurrence is so unpredictable and its appearance so fleeting that such attempts would be futile. There is scarcely enough usable electric energy in a terrifying bolt of lightning to supply current for an electric iron. Man can produce electricity for his needs, and his main concern with lightning is to devise better ways of protecting his power lines, buildings and other possessions from it.

The old saying that "lightning never strikes twice in the same place" may be somewhat of a comfort to people suffering from keraunophobia. But there is no truth to the adage—in fact, the exact opposite is actually the case. Experience has shown that if lightning strikes something once this is a pretty good sign it has found an attraction and will return.

The Empire State Building, for example, is a favorite lightning hunting ground for scientists because of the frequency with which lightning strokes have connected with the 1250-foot-tall structure. During a three-year period the tower was struck sixty-three times, and during one severe storm it was hit fifteen times in fifteen minutes. The steel framework of the building conducts the bolts harmlessly to the ground, while the structure protects an area roughly as far from the base of the building as the tower is tall.

Because of the frequency with which lightning is known to strike the Empire State Building, special recording machines and high speed cameras have been focused on it by scientists interested in learning more about this spectacular phenomenon. The cameras were not located on the building itself, but were set up approximately 2400 feet away, with an unobstructed view of the building.

Some surprising things were revealed by these photographs — surprising, at any rate, to people who are not electrical experts. A lightning stroke is not necessarily one single streak of current. It may consist of as many as forty discharges or multiple strokes—this is the reason some lightning flashes seem to flicker when viewed by the naked eye. The bolt originates as a comparatively weak "leader stroke," which progresses in a series of steps toward the earth, and, when contact is made, a heavier "main stroke" surges upward from earth to cloud.

Lightning is a fearfully destructive force, but fortunately the effects of a single bolt are not usually widespread. Examples of its power at point of contact, if not evident enough in riven trees, fused metal and blasted buildings, can be seen in the fulgurites, or "lightning tubes" sometimes found where the lightning charge enters the (Continued on page 386)

The Smithsonian Institution, photographed about the turn of the century and showing the center path that formerly led to the main entrance. "Improvement" of the Mall has removed the embrace of trees, many of them historic, and provided highways to speed the motorist of today on his way.

PHOTOGRAPH FROM THE SMITHSONIAN INSTITUTION

A Hundred Years of the Smithsonian

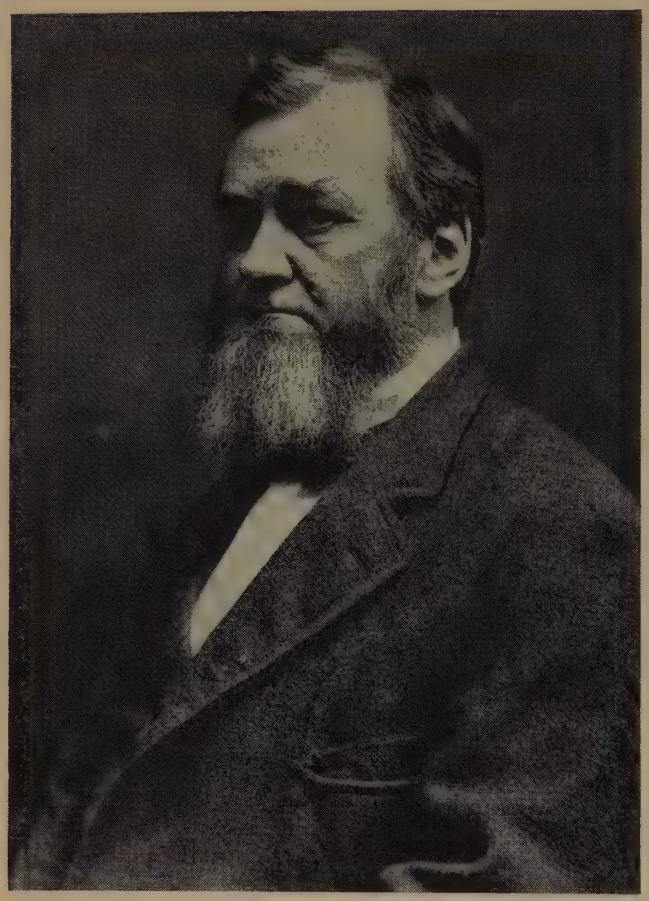
By PAUL H. OEHSER

MANY NOTABLE events occurred in the year 1846—more, indeed, than we shall here take space to enumerate. It was an important year in our national history. Three years ago Bernard DeVoto, an American historian, published a 500-page book called "The Year of Decision: 1846," and it is surprising to see how well that year served as a milestone in our country's development.

Scientifically, too, it was a year of decision, for in August, 1846, after many sessions of debate on Capitol Hill, Congress finally decided what was to be done with James Smithson's $500,000 bequest to the United States of America. In those early days great endowments for scientific, educational, and humanitarian purposes were not so common as they are today, and half a million dollars was considered a tidy sum. How best to appropriate this money was a question not to be taken lightly. There were those, in fact, who thought, with Senator Calhoun, that it was beneath the dignity of this nation even to accept this gift, especially from a foreigner.

Smithson had specified that he wanted to found at Washington an institution for the increase and diffusion of knowledge among men. This simple desire, it seems, was subject to broad and varied interpretation, but at last the argument and discussion ended, President Polk signed the bill founding the Smithsonian Institution, and the legislators resumed their concern with such matters as the Wilmot Proviso, the Oregon question, and a war with Mexico. On December 3, 1846, Prof. Joseph Henry, 49-year-old physicist from Princeton University, was elected the first secretary to head the new organization, and on December 23 the site for the Smithsonian Building was selected.

To increase and diffuse knowledge among men—this indeed has been the guiding purpose of the Institution, as Smithson intended, during these first hundred years of its history. Oddly enough, however, most of the two million and more visitors who now stroll through its halls every year get only a one-sided picture of its aims and achievements. Most of them think of the Smithsonian as primarily a museum. They come to see its prize exhibits, such as the *Spirit of St. Louis* and the *Winnie Mae,* the original Star Spangled Banner, the Presidents' wives' dresses, the paintings in its art galleries, the animals in its National Zoological Park, and thousands of other unique and interesting objects. Few of them are aware of what is going on, and what has gone on, behind the scenes. But the fact is that the Institution's museum-exhibit activities, important as they have been from almost the beginning, are only half the story. They, together with the Smithsonian's thousands of publications, represent the "diffusion of knowledge" that Smithson envisioned. The other half, the "increase of knowledge," is the research that is carried on in the laboratories behind the doors marked "no admittance" or "employees only," and in the offices ad-



PHOTOGRAPH COURTESY OF THE SMITHSONIAN INSTITUTION

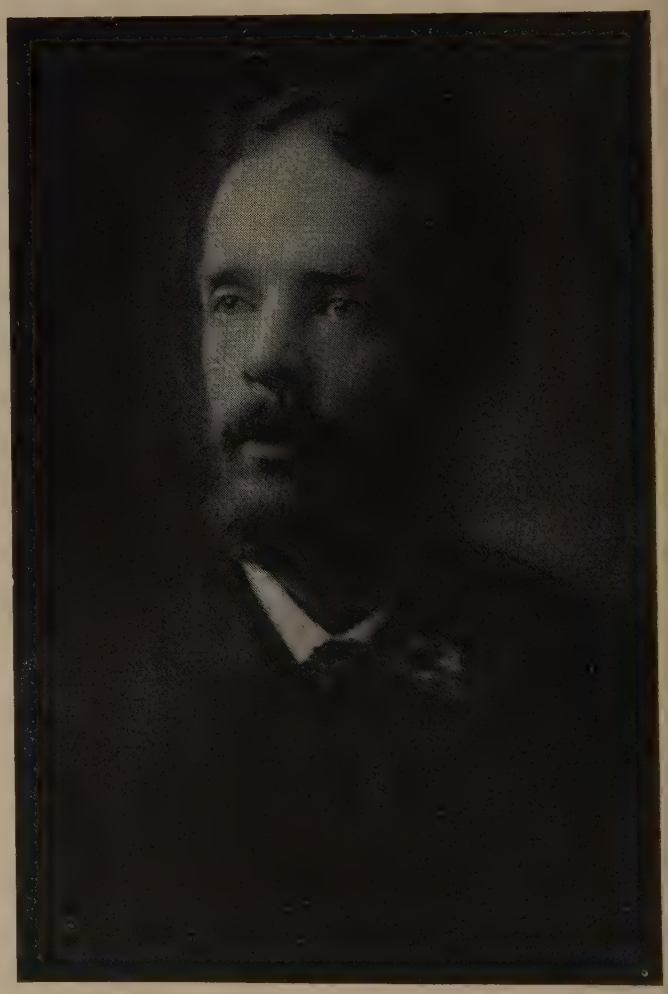
Spencer Fullerton Baird became assistant secretary of the Smithsonian in 1850, when he was only twenty-seven, and spent the rest of his life in its service, the first and greatest of the naturalists who have contributed to its distinguished history.

jacent to the great study collections of animals, plants, minerals, fossils, crania, and ethnological material. Indeed, it would be difficult to name a branch of scientific research with which the Smithsonian Institution has not, sometime or other, been concerned. And that, certainly, is as Smithson wished, for in his will he did not limit in any way whatever the scope, breadth, or direction of the Institution's activities so long as they should increase and diffuse knowledge among men. It was as if he wanted to put into direct effect George Washington's Farewell Address injunction: "Promote, then, as an object of primary importance, institutions for the general diffusion of knowledge."

A roster of distinguished Smithsonian scientists would contain many names inseparable from the history of American science. And readers of this magazine would perhaps be surprised at the number of great naturalists among them. From its very start natural history has been one of the Smithsonian's chief concerns, and over the century it has made perhaps its most enduring contribution in that field.

The first and greatest of these naturalists, of course, was Spencer Fullerton Baird, who became assistant secretary of the Smithsonian in 1850, when he was only 27, and spent the rest of his life in the service of the Institution. In 1878, at the death of Joseph Henry, Baird was elected secretary, and he served in that capacity until his own death in 1887. Before he went to Washington Baird was professor of natural history at Dickinson College at Carlisle, Pa., his alma mater, but his reputation as a scientist had far outgrown the classroom. Among his correspondents and friends he numbered the foremost naturalists of the day, including John James Audubon, John Cassin, Louis Agassiz, Asa Gray, J. D. Dana, Joseph Leidy, W. H. Dall, and many others. These friendships stood him in excellent stead when he began to administer the Smithsonian's affairs. At Carlisle he had made large collections of birds, mammals, reptiles, amphibians, fishes, and plants, many of which he packed up and took with him to Washington, where they are still preserved in their various departments at the National Museum.

In spite of his administrative duties, Baird was able to continue his work as a zoologist. The mid-nine-



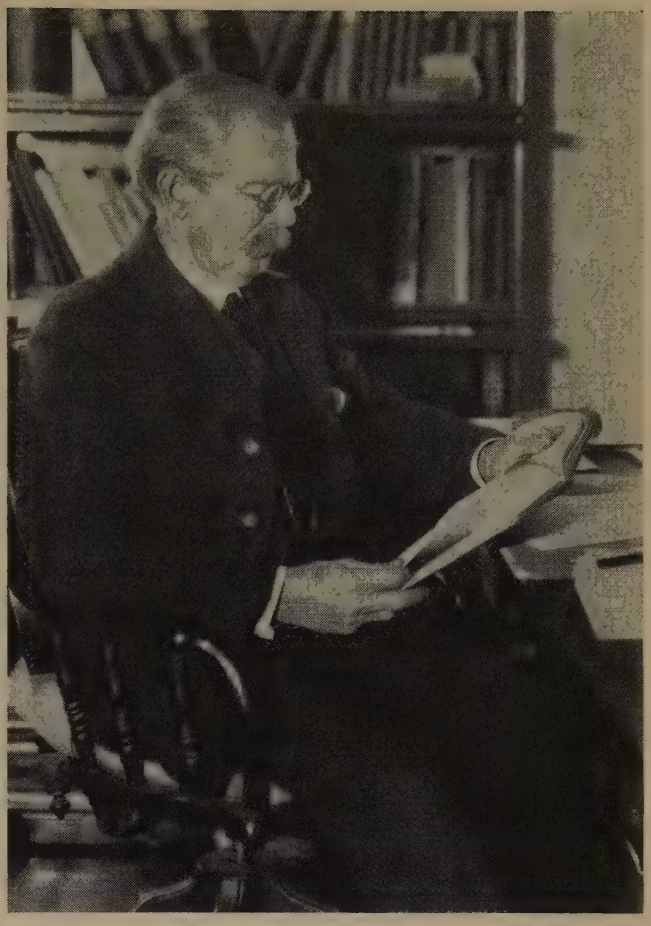
PHOTOGRAPH COURTESY OF THE SMITHSONIAN INSTITUTION

George Brown Goode came to the Smithsonian in 1873, and although he lived to be only forty-five he was one of the country's leading ichthyologists and a world authority on museum administration.

teenth century was an era of exploration and biological collecting, and some of the great expeditions to the West were sending back to Washington immense collections of specimens representing the fauna and flora of the new western territories. Among them were hundreds of new species of animals and plants, recent and fossil, and it was Baird's task to organize the highly exacting work of study and classification of these specimens. Many of them he described and named himself, and taxonomic literature abounds in new genera and species of animals bearing the name of Baird as describer.

Baird also became, in effect, adviser to the Government on matters of exploration, and his reports, many of them published by Congress, are still classic. An exploring expedition to Alaska by the Overland Telegraph Co., organized to build a line to Europe by way of Siberia and Alaska (the Atlantic cable having failed), was composed in part by Robert Kennicott, William H. Dall, H. M. Bannister, G. W. Maynard, H. W. Elliott, and Charles Pease, all under the auspices of the Smithsonian. Kennicott, who had previous experience, 1859 to 1862, in the Mackenzie River region, Canada, died near Nalato in the spring of 1866. Soon after, the ocean cable now assured of success, the whole matter of an overland telegraph line was dropped, and the party was disbanded. In 1867, when the purchase of Alaska from Russia was being hotly debated in Congress, Baird was called upon for a report, and, using the first-hand data received from the Kennicott party, he was able to furnish Secretary of State Seward and Senator Sumner with information that must have been convincing. As one writer has put it, "Baird pointed out the wealth of furs, fish, and timber, and showed that gold and copper had been found in the Territory, and that agricultural crops could be raised there. Apparently practically all the specific information regarding the value of the Territory, including the usefulness of Sitka Harbor as a base for naval vessels, was supplied either by the Smithsonian Institution or by men who had worked in Alaska under its auspices."

Baird was preeminent also as an organizer. He is credited with being the initiator of the United States Fish Commission, later the Bureau of Fisheries and now part of the Fish and Wildlife Service, and he was its first commissioner. He was godfather to the National Museum, and his broad knowledge and interest in all its branches were the mainstay of its first struggling years. "My object," he wrote at an early date, "is to make the Smithsonian Museum eminent above all others American for the value of its fossil remains, a department in which everything remains to be done." This kind of enthusiasm applied alike to other departments, his aim being to make the Museum collections the best of their times. In addition, the founders of the Geological Survey and the Weather Bureau were greatly indebted to him for help and council. All in all, as his biographer and friend William H. Dall said, "no man has more greatly contributed to the promotion of science in America than Professor Baird."



PHOTOGRAPH FROM THE DEANE COLLECTION, LIBRARY OF CONGRESS

Robert Ridgway came to the Smithsonian under the aegis of Professor Baird and was to follow in his footsteps as the foremost ornithologist of his day.

Baird was succeeded as secretary by Samuel Pierpont Langley, an astronomer and physicist, and the full burden of the administration of the National Museum fell on another great American naturalist. He was George Brown Goode, who had been a student of Agassiz and whom Baird had brought to Washington in 1873 as a young ichthyologist to work with the Museum's fish collection. It was not long before the Smithsonian officials realized what a find this "assistant curator" really was. Although he lived to be only 45 years of age, he distinguished himself in two fields of scientific endeavor. He became one of the leading ichthyologists of the country, and he became probably the world's foremost authority of the time on museum administration. He wrote both popular and technical accounts of fishes, one of his most important works being the monumental "Oceanic Ichthyology" (in coauthorship with Tarleton H. Bean), a treatise on the deep-sea and pelagic fishes of the world, published by the National Museum in 1896, the year of Goode's death.

In the science of museology Goode was a pioneer

and was without peer. His principles of museum administration were characterized by both practicality and foresight, and his treatises on "Museums of the Future" and "Principles of Museum Administration" are classic. Secretary Langley paid high tribute to Goode's abilities: "There was no subject in connection with the administration of the Museum to which he did not at some time or other give his personal attention. He had a quick eye for color and form, understood the art of decorating and case building, and had besides a special knowledge of subjects so widely remote from his own biologic interests that it is a question whether a new species or a new musical instrument gave him the greater pleasure. So fully could I rely on his judgment in all things, that even in matters not connected with the Museum I frequently sought the benefit of his advice."

Goode too had a passion for history, illustrated in such essays as "The Beginnings of Natural History in America," "The Beginnings of American Science," and "The Literary Labors of Benjamin Franklin." His flair for genealogy resulted in his book "Virginia Cousins," of which Postmaster General Wilson wrote: "Perhaps no family in this country has had so perfect a book, so complete a study of all its branches, as Doctor Goode gave to the family whose name he bore." He was an indefatigable bibliographer and an assiduous preparer of Government reports. He was interested no little in anthropology. "It would be difficult," said a colleague, "to find among those who are professional anthropologists a man who had a more exalted idea of what this science ought to be." He assisted in the organization of the Daughters of the American Revolution and designed their seal. He died on September 6, 1896, and was buried in Oak Hill Cemetery in Georgetown, D. C., where Joseph Henry and Spencer Fullerton Baird also lie. His unmarked grave may be found on inquiry from the caretaker; but perhaps he needs no other monument than the solid and enduring part he played in guiding the destiny of the Smithsonian Institution.

Another man who came to the Smithsonian under the aegis of Professor Baird was Robert Ridgway, who was to follow in Baird's footsteps as the foremost ornithologist of his day. He began corresponding with Baird when he was only 14 years old, and in 1867, when he was 17, he was appointed through Baird's influence as zoologist under Clarence King engaged in the geological survey of the Fortieth Parallel. At 19 he published his first paper on birds—a note on the belted kingfisher, which appeared in 1869 in the *American Naturalist*. The same year the Academy of Natural Sciences of Philadelphia published his "Notices of Certain Obscurely Known Species of American Birds." These formed the beginning of the hundreds of Ridgway's contributions to ornithology, extending over a period of 60 years.

Ridgway's most pretentious work, which is probably the most ambitious undertaking in American systematic ornithology, was "The Birds of North and Middle America." This catalogue, which includes technical descriptions of every form of bird known from the northern section of the Western Hemisphere, with complete synonymies, identification keys, ranges, seasonal plumages, diagnostic characters, and measurements, consumed most of his official time from 1894 until his death in 1929. Eight volumes were published by the National Museum during his lifetime, one has appeared posthumously, and one is in press as this is written, these latter in coauthorship with Dr. Herbert Friedmann, Ridgway's successor as curator of birds in the National Museum. At least two further volumes will be required to complete this great series.

Both Robert Ridgway and his younger brother, John, were considerably talented as painters of bird portraits, and they executed drawings for the color plates of such distinguished books as Fisher's "Hawks and Owls of the United States." As a boy, Robert had mixed his own paints in his father's drugstore in Illinois, and he soon became deeply interested in the subject of color. He early saw the need, especially for the use of naturalists who must be able to describe species of plants and animals with unmistakable accuracy, for a standardization of colors and color terms. To this problem he devoted his serious attention, and in 1886 he was able to bring out his first work on the subject—"A Nomenclature of Color for Naturalists." In this he presented 10 plates showing 186 named colors in small rectangles. The value of the work was apparent to all concerned, and its reception encouraged him to continue his color studies. It was 25 years, however, before he was ready with the new and enlarged edition of his color book. This was entitled "Color Standards and Color Nomenclature," and in it were illustrated 1115 named colors, for which he had scientifically mixed the pigments himself according to standard proportions worked out by him and published in the book in tabular form. This book became widely used not only by naturalists but also by paint manufacturers, chemists, florists, and artists. It found many commercial and industrial uses, and although other and more modern color standards have since been published, Ridgway's was a pioneer work and has never been entirely superseded. Among naturalists it is still the "color bible." It made Ridgway's name known far outside of ornithological circles and constituted perhaps his most important contribution to science.

I have here given brief glimpses of only three of the Smithsonian's naturalists who have played a distinguished part in carrying out the desire of James Smithson to spread scientific knowledge throughout the world. The complete list would be amazingly extensive. It would include, for example, William Healey Dall, who went with Kennicott and Bannister to Alaska in 1865 on the expedition already referred to, and who was later to (Continued on page 383)

G.I. Bird Study

By ROBERT H. WELKER

Illustrated by the Author

In Italy the G.I. bird student's favorite singers were the blackcap and the blackbird, and, of course, the skylark. Air raids and other noise and confusion of warfare failed to disturb the birds.

It was February, 1943, and our convoy had made the passage safely across the Atlantic to Casablanca, French Morocco. All the way over, as our ships ploughed in magnificent unison through the winter sea, I had been looking vainly for birds. Those few I had seen, other than the familiar species, I had not been able to identify without field glasses—something that my bulging barracks bags did not contain. But here, now, was the mysterious land of Morocco. We could see palm trees along the edges of the harbor, and fig and eucalyptus trees on the low yellow hills beyond the town. Field glasses or not, I felt the Dark Continent was about to yield up some of its bird secrets to one member of the United States Army.

It did, and quickly. Grain had been unloaded at our pier, and some of it had spilled here and there about the area. I thought: "What is that bird call?" It was a familiar *cheep, cheep, cheep!* No! It could not be! But it was. There, hopping busily about among the spilled grain, was the last land bird I had seen before leaving Staten Island, the house sparrow. It was only a slight consolation to learn, long afterward, that I probably had seen a North African subspecies, *P. tingitanus,* of this familiar little bird.

Morocco had other ornithological disappointments in store. Half an hour later we were leaving through the guarded gate of the docks, when I broke Army marching regulations by gazing upward at a flock of dark birds flying swiftly overhead. They were starlings, undeniably. Later that day I saw an agile group of birds playing above our tent city, and in size, color, action, and call—in fact, in everything but species title—they were just barn swallows. To a soldier far from home they were good

The hoopoe was first identified as a member of the woodpecker tribe. Then one day, on the Algerian desert, the author saw it erect a fan-like crest and go running from one sparse clump of vegetation to another as swiftly and as easily as a quail.

to see, but somehow, if I were to see swallows in Morocco, I expected something perhaps lavender, gold, and green. Again, I hardly expected my first African raptore to be merely a larger edition of our sparrow hawk called the kestrel. That bird, far from dashing in pursuit of some worthy prey, was seen flying in big friendly flocks over Casablanca's buildings, busily catching insects.

But soon there were birds much harder to identify, or even to place within a particular bird family. I felt the need for field glasses and for some kind of guide. A quick survey of Casablanca's camera stores and pawnshops disclosed not a single *jumelle*, except for tiny mother-of-pearl opera glasses. But I did not give up so easily on the search for a bird book. Like many cities in France, Casa is full of small book shops, and there were numerous thunderstruck shopkeepers who heard an American sergeant ask for *un livre des oiseaux du Maroc*—you know, birds, *comprenez?*" Some of them were volubly sympathetic; some merely shrugged their expressive shoulders; one or two even smiled a sly Gallic smile as though wondering: "What does this American *really* want, postcards?" Anyway, there was no book of Moroccan birds—or any kind of birds, for that matter—in all of Casablanca. I was beginning to believe what a homesick Frenchwoman told me: "Ah, this is a terrible land, almost savage!"

Against the winter sky the bee-eater at first appeared to be all black or dark gray. Later, in the sunlight, it was seen to have a bright yellow throat, blue-green breast, chestnut cap, yellow back, and bluish wings and tail.

Of course Morocco's birds did not wait for my discovery of glasses or guide. They kept flying overhead and calling and alighting nearby, and I had to study them as best I could, when time from Army duties allowed. I did not have to go far to make a positive identification of the European goldfinch, since this bird—and also a small rosy finch—is commonly captured and marketed in cages along the streets. But most of the birds were to be found in the city's parks or in the outlying areas, the fields and dry wastelands and rocky pastures inland, and the verdant area north and south along the coast. On the roof of a seaside villa some miles north of town I discovered the nest of the white stork, buzzard-sized birds with huge black-bordered wings and a red bill. The pair raised a family unaware that the building below—a Chemical Warfare depot—housed enough mustard gas, Lewisite, and chlorine to wipe out many thousands of families, avian or human.

As soon as I began to see birds of uncertain identity, I found myself making comparisons with those I had known all my life, with results both good and bad. A handsome black, white, and chestnut bird looked to me like a shrike, even though it caused no alarm among small birds. Indeed, it later turned out to be *Lanius senator*, or, as the French picturesquely call it, *Pie-grièche à tête rousse*. Then one evening I heard a scold note shouted across a wooded park and instantly compared it to the robin's. Seeing the bird and hearing it sing confirmed the likeness, although it was all black with a reddish bill, and a little larger and more energetic than the robin. The family resemblance in this case was also genuine; the bird was *Turdus merula*, the blackbird that Henley praised in his poem beginning:

The Nightingale has a lyre of gold,
The Lark's is a clarion call,
And the Blackbird plays but a boxwood flute,
But I love him best of all.

A superficial field resemblance led me far astray in guessing the identity of one of the most interesting birds seen in Morocco. It came flying over our tents one day, wide-winged, long-billed, crested,

The trick of "squeaking" proved that Swiss birds were just as gullible as their American cousins. Down from the tree tops came a whole group of them, including the crested tit, the coal tit and blue tit (above and below), the goldcrest and the nuthatch.

Here is an adult upland plover, about two-thirds natural size. Its weight would be about six ounces. Its mottled color pattern consists of deep, rich browns and grays. The stilt-like legs and the long bill are greenish-yellow.

The Upland Plover

By CHARLES W. SCHWARTZ

DURING the first week in April, when the prairies of Missouri are resounding with the booming call of the courting prairie chickens, the first long, trilling whistle of the upland plover can be heard. This announces the return of the bird from its wintering grounds on the Pampas of Argentina and southern Brazil. Upon arrival in their breeding grounds in the United States and Canada, the birds are already paired, although nesting does not begin until about the second week in May. Following the raising of families, the young and adult birds gather into flocks for their southward migration, which begins in late July or early August.

Unfortunately most of the foregoing must be considered as in the past tense. Before the beginning of the present century, this gentle, confiding and useful bird had been so depleted by over-shooting that its extinction seemed imminent. Some give the destruction of habitat as the reason, unmindful that settlement and increasing persecution go hand in hand. Words fail to describe the pitiless slaughter, particularly over the Great Plains from Louisiana to Minnesota, that met this bird as it passed northward in spring and southward in late summer with its young. Even during the nesting season, after the bulk of the birds had gone on northward, it is on record that some of those remaining to nest formed a part of the shipments of birds to the markets of the larger cities of the Mississippi Valley and the East.

In Louisiana and Texas, particularly, the "papabotte," as it was called, especially by the Creoles, was the quintessence of gastronomical enjoyment, and commanded a high price. As early as 1907 Forbush says of the species, "once a common summer resident of upland fields, it has long been on the road to extermination, and can now be saved only by enacting and enforcing stringent laws for its protection in those states where it breeds, as well as in the more southern States, where the birds find neither rest nor mercy."

Fortunately the Migratory Bird Treaty, and the stopping of market shooting, checked the upland plover's march toward oblivion, and it is slowly increasing as a breeding bird in North America. On its wintering grounds on the Pampas of southern South America, with protection nonexistent, it must still face the gun.

Nests of the upland plover are usually in open meadows and pastures, the exact site frequently being in a tuft of grass. The nest is a slight depression about four inches in diameter. Four eggs make up the usual clutch, although rarely five are laid. They have a buff background with dark and light brown splotches. The egg of the plover is large in proportion to the size of the bird.

A plover chick emerges from the egg. The egg at the upper left has been pipped. Incubation of the plover eggs takes twenty-one days, although it may take as much as three days for all of the young to hatch. The upland plover emerges from the side of the egg.

Two upland plover chicks have just hatched, and the remaining eggs are pipped. (About natural size.) The development of the young is rapid. The three-day-old plover chick at the right is, however, considerably larger than natural size. Below is a mother plover and her chick. Before the youngster is even dry it has scrambled up on its mother's back to view this new world. Before the last egg has hatched the chicks frequently leave the nest and hide themselves in the grassy cover, "freezing" instinctively when they are discovered.

An attractive and typical view of two upland plovers perched on fence posts, from which they will launch forth in protesting flight if they fear disturbance of the nest. On such an occasion, the sweet, rolling trill is replaced by a clear whistle that, although still musical, has a threatening quality.

A Sagebrush Cinderella

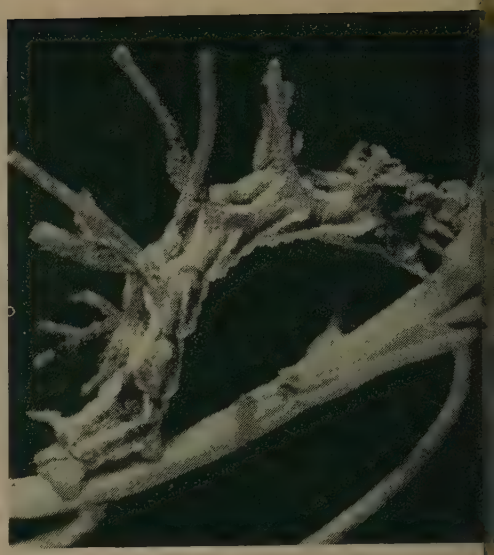
(Sequel to "The Enchanted Sagebrush")

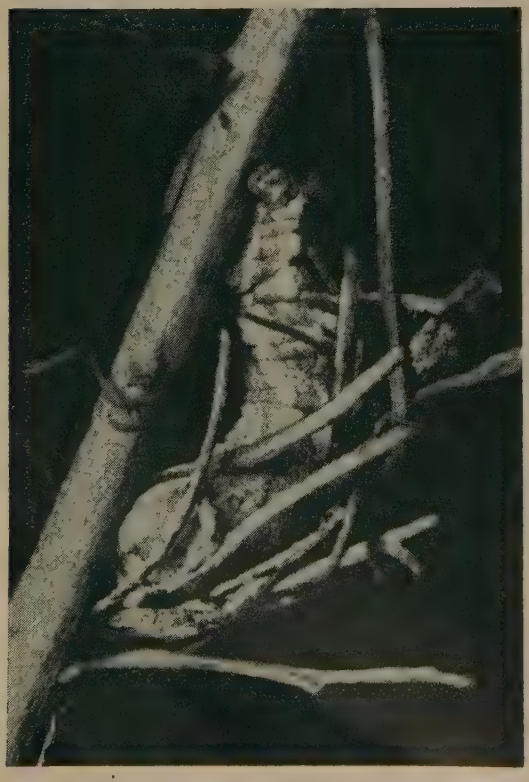
By GEORGE ELWOOD JENKS

"The Rubbish Cat" is a peculiarly appropriate nickname for the heroine of this life story of the Cinderella moth, *Nemoria californica.* The picture at the left is the same one that concluded the feature, entitled "The Enchanted Sagebrush", in the May pictorial section of *Nature Magazine.* If you will turn the picture a quarter turn to the right, clockwise, you can see the rubbish cat-erpillar as it looks when standing straight up on its hind legs, the pose in which it was taken when it was lightly touched with a straw. The picture below shows quite clearly . . .

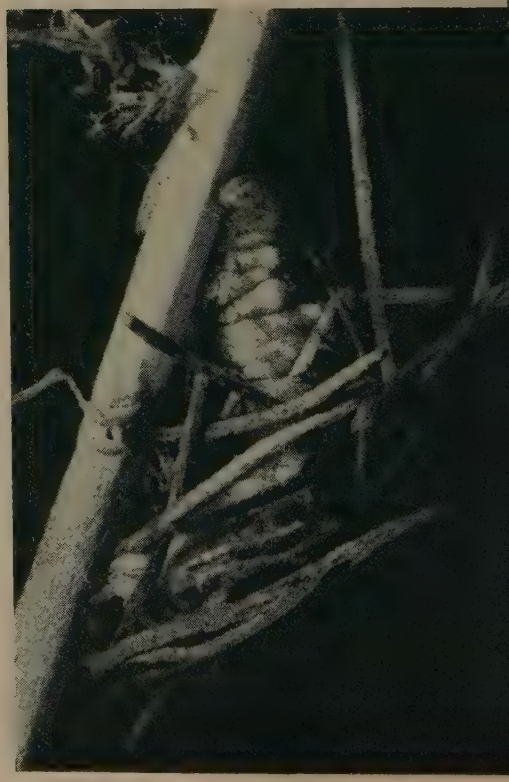
. . . the tiny caterpillar—less than an inch long when fullgrown—in its normal, right-side-up position. Now it is quite clear that what seemed to be wooden legs or stilts are actually bits of rubbish stuck on its back for a protective camouflage. Here the caterpillar is engaged in its favorite pastime of eating. It has started at the tip of a tender sage "needle" and is wolfing it down so fast that you can actually see it disappear, much as an ice cream cone disappears in the hand of a small boy.

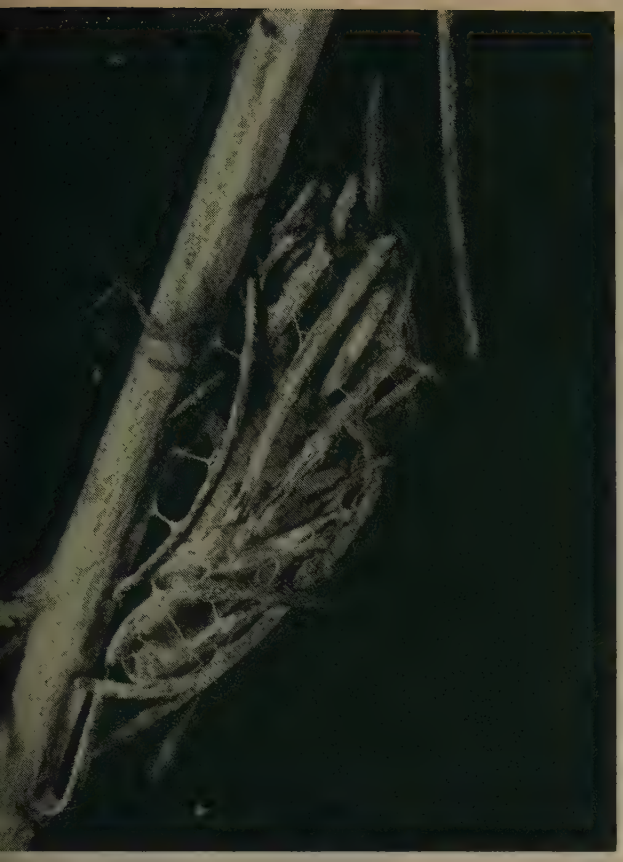
The protective device of most caterpillars is usually in the color part of their skins, but Nature provides this little dressmaker with a "foundation" bearing several pairs of barbed spurs, upon which it sticks short lengths of sage leaves and other rubbish. At the left these have been plucked off to show the foundation. But the caterpillar will promptly clothe itself again, and has already started to do so. At the right the little Cinderella has picked some fresh sage leaves for a silvery-green gown. Within a few hours these fade to a dirty brown and the caterpillar is just a bundle of rags. Then along came the fairy godmother, Nature, whispering in the mysterious language of instinct . . .



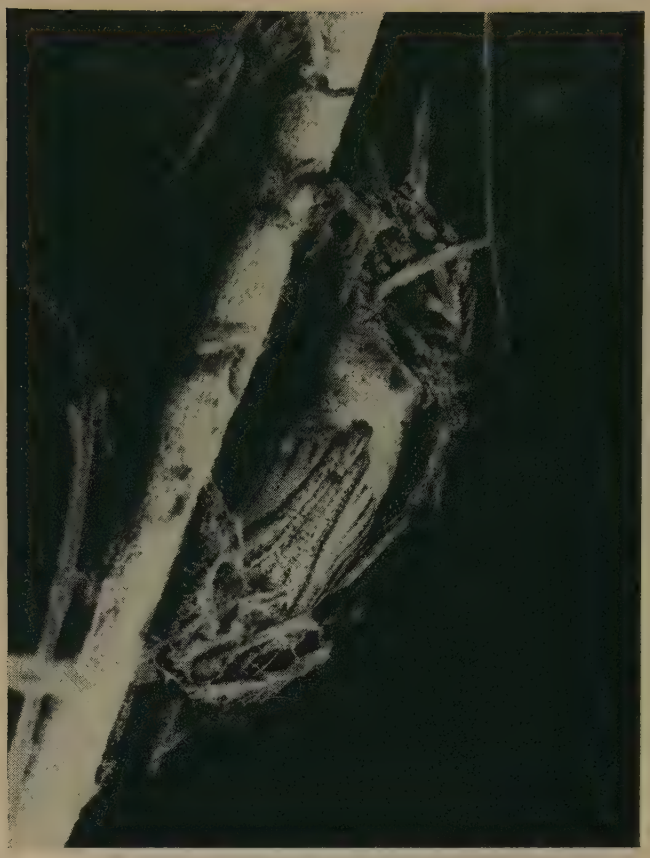


. . . and it was no story of changing a pumpkin into a fairy coach. Instead, it was the story of how to build a basket-work "coach" of the caterpillar's own making. For material it cut some long strips of sage and stuck them on its back, sticking them with a substance spun by its mouth. The caterpillar added to this load until it looked like a peasant woman carrying a huge load of faggots on her back. Climbing higher and higher, the caterpillar finally found a likely spot (left) and there started to weave the basket about it. Man, with all his wisdom and science, could well pause in admiration of this achievement. He could hardly hang by the heels, laden with a bundle of basket-strips on his back, and still weave a snug basket about himself, tying it all together with strong silk spun with his mouth. The caterpillar did.

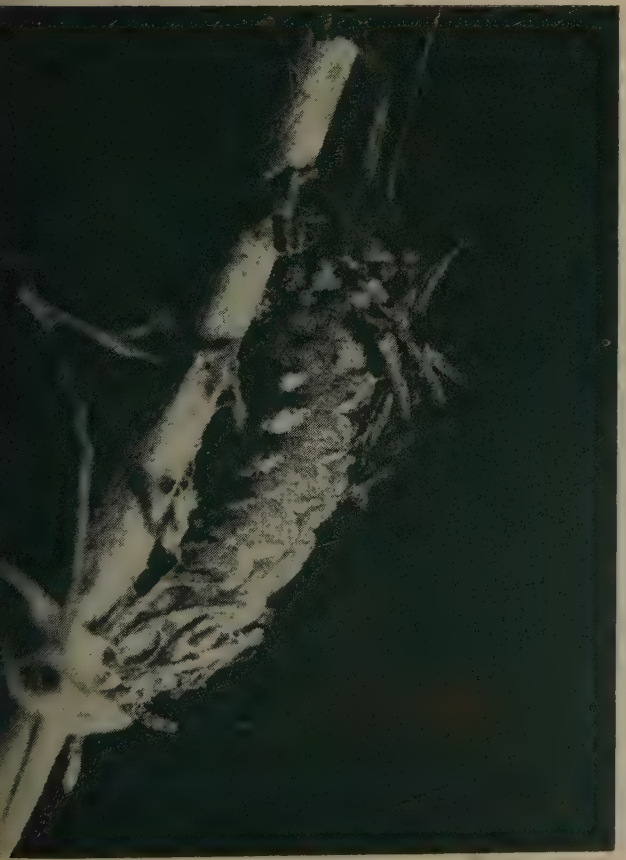




The fairy coach of the Cinderella caterpillar is finished at last. Of course it has no wheels, and the body of the coach is stuck fast to the sagebrush, and the lone passenger seems to be asleep, or dead. But within that swollen, crumpled skin a little traveler is soaring through realms of creative life that science is still trying to explain. Within a few hours the worn-out caterpillar skin is split and is sloughed off, and we see . . .



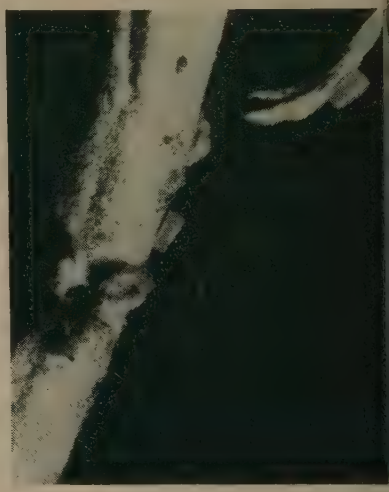
. . . what seems to be an entirely different creature. But we cannot tell just yet what lies within that quaintly carved chrysalis. It looks like an Egyptian mummy-case. But this mummy is very much alive, and it writhes protestingly when touched. Several weeks pass while the hidden bit of transforming life passes through other mysteries of metamorphosis. Then, one day, the chrysalis splits and out comes . . .



. . . a silvery-green and beautiful moth. This is the Sagebrush Cinderella. And while she waits for her limp wings to straighten and grow strong, she sees, upon a nearby branch . . .

. . . another fairy coach, a beautifully built carriage fit for Royalty. Perhaps the sight did not mean much to her just then, for . . .

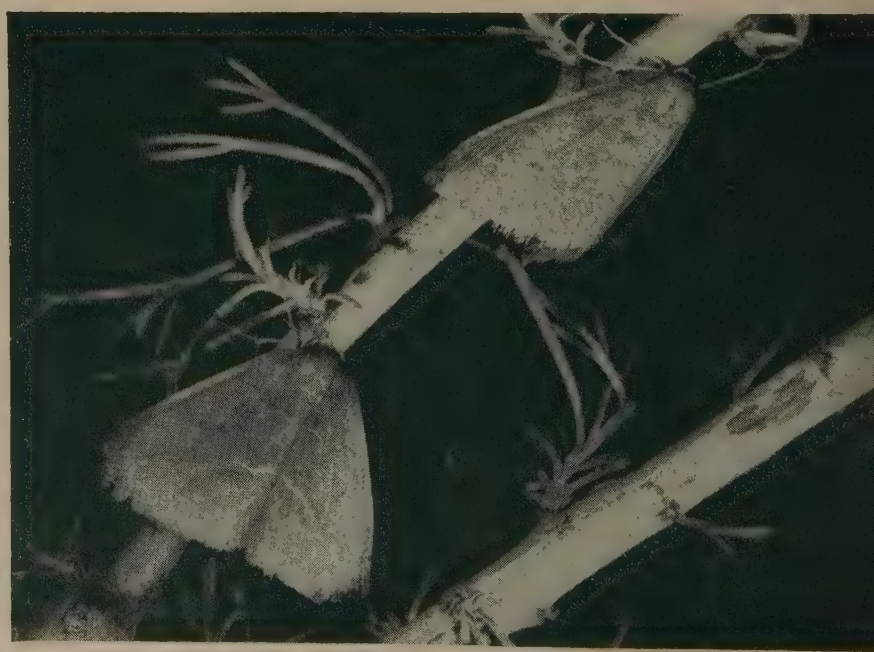
. . . the Fairy Prince, just, perhaps, as she had dreamed he would be. And it was beyond question that he was seeing in her the fulfillment of his own dreams. In any event, and as they say in books, "and so they were married" . . .



. . . and children came to brighten their days. Children in the form of eggs laid on the stem of the sagebrush. Here we see them, greatly enlarged . . .

. . . she had ample reason to be absorbed in the fulfillment of her own dreams. She was clad in an exquisite silken gown, a delicate pastel green and the very color she had loved in the silvery sage. And then, perhaps, she heard another faint whisper from her fairy godmother and she turned and looked. There was . . .

. . . And, again, as they say in books, "they lived happily ever after." Or at least as long and happily as insects live. And they dwelt in the world of the enchanted sagebrush as those before them had done, time without end.



Plain Talk on Wildlife Conservation

To us the outstanding address at the recent North American Wildlife Conference was made by E. Sydney Stephens, Chairman of the Missouri Conservation Commission. It was plain talk from a man who has given much thought to the problems of the moment in wildlife conservation, and who is in a position to know whereof he speaks. Some of his points deserve a wider audience than the Conference session or that the *Transactions*, later to be published, will afford.

The title of Mr. Stephens' address was "Where Are We and What Time Is It?" Pointing out that we are faced with "the certain prospect of increasing demands on our natural resources," he declared that "there are ugly spots in the wildlife picture. . . . We still read and hear about exploitation, commercialization, game hogs and violators, and we know that they exist despite education and law enforcement. But we are inclined to think of them in terms of uncouth, uninformed and sometimes criminal individuals. There is no doubt that such gentry are with us, but we are prone to overlook the organized and well-heeled predators of special privilege. . . . They frequently ask to be exempted from restrictions which they insist should be placed upon others less fortunate. . . . Too many hunters and fishermen regard bag and creel limits as goals to be attained rather than deadlines beyond which they may not go."

Progress and gains have been recorded here and there, Mr. Stephens asserted, but existing agencies—federal, state and private—are not yet doing the important task of telling the general public the story of conservation and the vital relationships between land and all its products, which are fundamental to a balanced civilization. Attempting to assess the blame for this failure, the Commissioner asserted that it lies principally with state administration. Assaying the state administrations, Mr. Stephens applied a few simple and reasonable standards—"adequate legal authority, employment of trained personnel, the development of wildlife environment, education, practical research, cooperation with landowners, and the support of citizen organizations."

"Judged by these standards," Mr. Stephens said, "here is how the states rate: Twenty-five are lacking in adequate legal authority to administer wildlife resources or to regulate their use. Regulation is essential to conservation; the two are inseparable; to divide them would be like trying to build a savings account and giving a second party a book of blank checks. . . . Sixteen states employ no trained technicians whatever, or are not better than twenty percent equipped or manned. Fourteen give no attention to the improvement or development of environment. Twenty-one carry on no cooperation with any group or individual. Fourteen make no effort whatever in the field of education, and twenty others do not claim to be more than fifty percent efficient in that vital field; none is more than seventy percent efficient. Twenty-three, or practically one-half of the states, do not carry on research of any kind. Nineteen do not cooperate with any landowner or land use agency. Five states maintain no forestry department or agencies, and six have no cooperative forest fire prevention and control program. . . . Twenty-three complain of the absence of adequate support of organized groups. The turnover in directors is faster than a jet-propelled plane."

Mr. Stephens gave only five states a "passing grade of sixty or better" on efficiency, and pointed to pitiful deficiency in the application of sound practices; to the continuation of outmoded and even detrimental policies; to domination by politics; to lack of education and research activities. He declared that "there are a lot of people interested in more wildlife and better living, and that includes just about everybody—everybody who eats, wears clothes and lives in houses. They can be expected to do something once they are aroused." The responsibility of arousing the people rests, he went on, upon the outdoor writers, if they will only learn what conservation is.

"The trouble is," Mr. Stephens continued, "that about ninety-eight percent of them apparently don't know what it's all about. They either clip and paste, or they write glowing accounts and publish pictures of what Joe Doakes killed or caught last weekend, which only invites and incites millions of others to go and do likewise. But nary a word about what it takes to put fish in streams or birds in fields. Too often they preach the heresy of re-stocking of fields and streams, and keep alive in the minds of hopeful and greedy nimrods and fake state departments the vain hope of more game from incubators and brooders, and they completely ignore Mother Nature, who can do a vastly better and bigger job. . . .

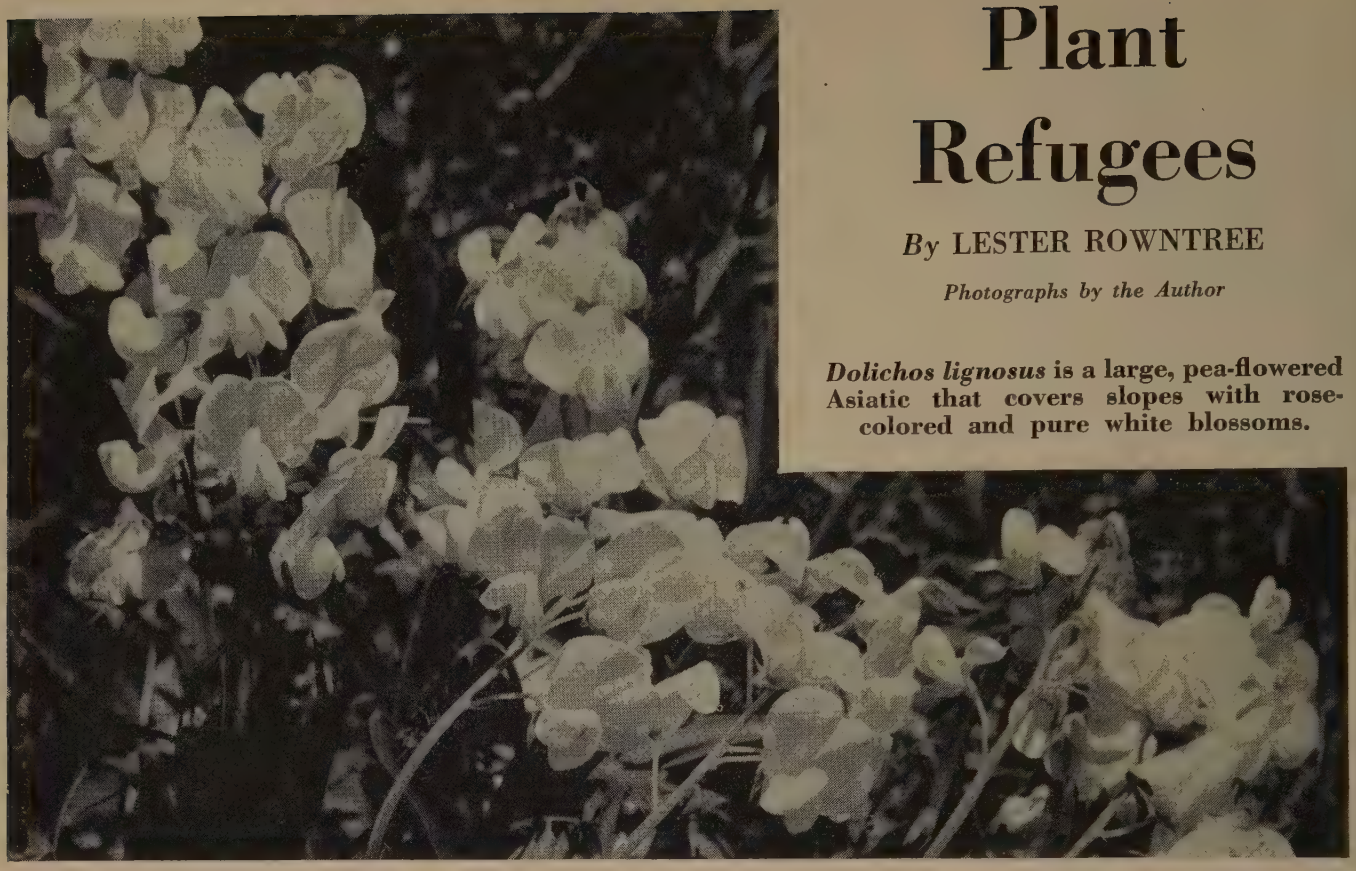
"All of us here, it can be assumed, know the stake which wildlife, indeed human life, has in sound conservation, but the rank and file of the people—and especially the 'sportsmen'—don't know it. . . . Here is an inspiring challenge to the outdoor writers of America and a plain and solemn responsibility."

Mr. Stephens has, through this plain talk, written our editorial for us. He has shown the responsibility that rests not alone upon administrators and outdoor writers but on everyone interested in wildlife. This is no time for complacency.

Plant Refugees

By LESTER ROWNTREE

Photographs by the Author

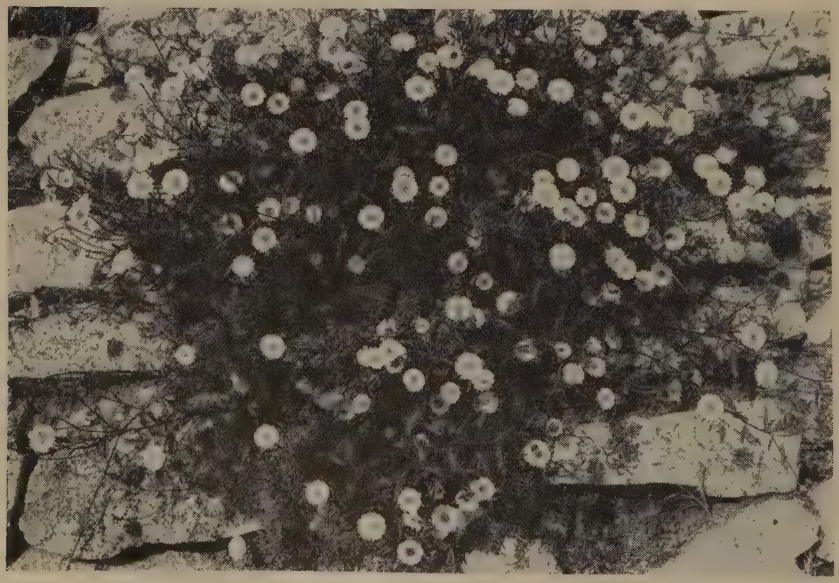


Dolichos lignosus **is a large, pea-flowered Asiatic that covers slopes with rose-colored and pure white blossoms.**

ANYONE whose life has been spent with green, growing things, studying them in their native homes, as well as in the garden, can usually spot a gone-wild plant on sight. This is true, even though some species have become so strongly and widely entrenched that a botany text must clinch the fact that they have escaped from cultivation.

"When does an escaped plant become a wild plant?" I am often asked. My own belief is that a wild flower from one country should never be considered a wild flower of the country of its adoption, no matter how prolifically it has spread. Some exotics have settled down so happily in America that we are no longer told the distinction. And when corn marigold, a wild plant of Europe, Africa and Asia, was exhibited with native California material at the San Francisco Fair, it was labelled "native."

All garden plants either grow wild somewhere in the species form, or else have been labored over by hybridizers and turned out, thoroughly tamed and sometimes almost unrecognizable, as named varieties. Climate and soil conditions control the measure in which an exotic plant runs wild. During my lifetime I have left a trail of casual flower-escapes in several different sections of the United States, but in no two places have the same plants spread. Returning to a New Jersey garden I made long ago, had worked and loved for over ten years, I found that lily-of-the-valley had established itself down in a deciduous wood and was thriving there as lustily as its neighboring anemones and bloodroots. There it found the moist leaf mold to please it, but nothing could induce a lily-of-the-valley to go wild in summer-



New Zealand daisy, *Erigeron mucronatus*, provides almost everbearing, fluffy mounds of white flowers tinged with lavender.

Prodigal Star of Bethlehem is a Mediterranean that merits re-admission to the eastern garden.

Large-flowered, pink and white, *Oxalis variabilis* is an African that nicely fills in stony crevices.

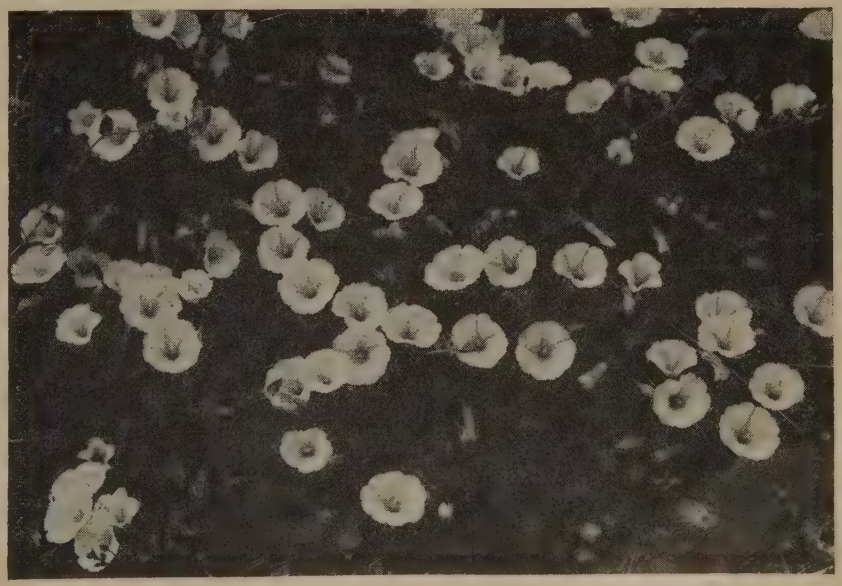
dry, winter-warm California. It seems to know better.

I like to divide escaped plants into stay-at-homes and invaders, for while many of them are content with a foothold within a mile or so of their original garden home, some have run away with the leash so completely as to become country-wide gypsies. Some of our most annoying weeds are natives of other countries, and it behooves the plantsman to be careful which flowers he allows to become established outside the garden fence. Even such beauties as the Bermuda buttercup, *Oxalis cernua*, have become pests. This lovely lemon-yellow thing, by the way, is no Bermudian. Going there from Africa, its home, it made a nuisance of itself, was brought to Florida, and now lays a yellow blanket over the orchards of that State and of California. Many escapes are forage plants with no decorative value. During my first stay in California—more than forty years ago—wild flowers jostled one another in weedless masses, although "filaree," *Erodium cicutarium*, was beginning to take over the empty lots around towns. Introduced weeds are now so thick in this State that many spots that were formerly wild flower gardens have now become nothing but weed patches.

A great many of these mischief makers came to this country as stowaways, and began life in the new country where ballast from sailing ships had been dumped; some came in baled goods; some in packing material. That is why those sections of the country that were colonized by early settlers make such good hunting grounds for the tracker-down of escapes. Not only weeds grow in such regions, but flowers as well, for home-sick women somehow find a way of smuggling in coveted flowers from former overcountry or overseas gardens. Although the women and their homes have now gone, the flowers and pot herbs still bloom beside the rotting fence posts and among the crumbling bricks.

Renegade plants are thick in Virginia, as they are in the coastal towns of the Northwest. Garden strays wander far and wide over the Mother Lode country in the mining districts of the Californian Sierra foothills. Ghost towns on the deserts are short on plant runaways because it is in comparatively recent years that plants from desert-like regions have been introduced into America, but in the mountains, where there is rain, every deserted home has its rose bush.

Year after year, in out of the way places in the Sierra, I have watched forage plants take the place of wild flowers as trails are lengthened and pack animals enter areas that were formerly inaccessible. Seeds have endless ways of getting around, and some of them are admirably fitted for being blown or carried from place to place. The sticky ones and the ones with spikes resort to hitch-hiking, traveling in the



A European, white-flowered morning glory, *Convolvulus arvensis*, sends out its creeping roots and has become the bane of many an orchardist and gardener.

Some escaped plants have taken over this corner of a country garden, asking little and giving much for the privilege.

fur of animals. An army of shrubs from a distance springs up along hedgerows and fences from which birds have dropped seed. Trees appear beside rocks where jays have buried their left-over supply, having brought the nuts there to crack. Down the sides of one river in Humboldt County foxglove seeds have drifted and landed to become a part of wild flower assemblages along the water's edge.

Composites are ardent truants. Lumped together they compose a sizable number of the hundreds of exotic escapes in America. I have seen the slopes around old farmhouses covered with the yellow of annual chrysanthemum. *Coreopsis tinctoria,* that all brown-and-yellow annual, is a native of eastern and central States, and the improved forms make grand standbys in our summer borders. It has recently taken up its abode in Trinity County, California. English daisies now nestle among the trilliums and clintonias of the coastal redwood region, and ox-eye daisy, a native of northern Asia, blanketer of soil-sad acres in eastern States, has become a troublesome weed in Oregon and Washington, and is at home in the fields and hedges of northern California. I have found different species of European centaureas roving about in many States; *Centaurea maculosa* has gone wild on Martha's Vineyard. Several centaureas now roam the moister parts of Montana, coming into bloom just as the clematis passes from the star-flowered to the fluffy-seeded stage. Lilac-lavender *C. leucolelpis* is on the loose in New York State, where it foregathers with Michaelmas daisies, carrot and clover—a wild-tame colony often joined by a refugee mauve-pink scabiosa. Long ago lavender-pink *Centaurea nigra* landed on Gaspé, moved slowly south, and is now one of the few tame-wild plants on Mt. Desert Island. There it is especially lovely, found flowering in wet spots with the large, purple, fringed orchid, *Habenaria fimbriata.* And in many places that gad-about, cornflower, *C. cyanus,* invades fields of yarrow and lupine.

Most of the composite vagrants in the Southwest are Africans. Several of the cape-marigolds, *Dimorphotheca,* have fled from gardens, the annual ones as well as charming perennial, *D. ecklonis,* with large white flowers having gray-blue centers. Near the tourist desert town of Palm Springs, stalwart *Venidium fastuosum* has left the sandy lots where it was sown and made for the wide open spaces; it has not got far, but it makes some vivid orange blotches on the outskirts of the city. One day in May I was plant-snooping in the San Bernardino Mountains and was puzzled over a sheet of yellow above me. It was not the place for any of the lowland daises, I thought, and all wrong for Californian poppy. When I reached the patch, surrounded by gilia, lupine and phacelia, millions of South African *Ursinia pulchra* blooms looked up at me, just as though they had always been there among the Californian wild flowers.

Sometimes I think I will let my horticultural activities go into reverse and have a garden made up only of escapes. Among those that would gladly accept space on my hillside is the large, purple-flowered, everlasting sea-lavender, *Statice perezii,* from the Canary Islands, which used to be grown by Japanese florists near San Diego, and which still flourishes in abandoned places on the outskirts. Near it will go a New Zealand daisy, low-growing shrubby *Erigeron mucronatus,* to give me almost everbearing fluffy mounds of white flowers tinged with lavender. There will be tall, plumy clumps of European pampas grass, which, on the Monterey peninsula, coasts down from gardens above roadside banks and lands in the ditches below. Several of the Mediterranean rock roses will form low, rounded bushes, all alive in May, June and July with flowers resembling large, single, white roses. I will duplicate rose-colored and pure white slopes of Asiatic *Dolichos lignosus,* large, pea-flowered and voluptuous looking; and such fragrant banks of multicolored sweet peas as one comes across along May and June roadsides in Santa Cruz County. Nasturtiums and brilliant common geraniums will flash from the ground around my composts, just as they do from city dumps (Continued on page 386)

Cosmic Question

By FELICE DeHORVATH

Plutonium, uranium,
Delphinium, geranium;
Upon the ear they fall the same,
The terror word, the flower name.

And who shall say where lies more power
In bursting bomb or budding flower?
Delphinium, geranium,
Plutonium, uranium.

Such beauty spots as St. Mary's Lake in Glacier National Park have been preserved for posterity. Let us protect and restore our country to the end that it may be itself a fitting memorial to its own two-hundredth anniversary in 1976.

A Bicentennial Memorial

By ALDEN JESSE CARR

JULY FOURTH of this year marked the one hundred and seventieth anniversary of the independence of the United States. Only thirty years from that date we will celebrate the two-hundredth anniversary of the founding of this Republic. It is not too soon, today, to prepare a suitable memorial for that bicentennial event, or to reflect upon what form that memorial should take.

Three decades hence—as is already the case now—the United States will be one of the oldest, if not *the* oldest country whose basic form of government, whose unceasing march toward goals of freedom and happiness, will have remained essentially unchanged since its founding. Such a national persistence in the face of all obstacles is both a tribute to the wisdom and foresight of the founding fathers, and to the contribution of all persons, important and obscure, who have done their part in the years that have passed.

The significance of the bicentennial will be further increased by the probable position of the United States in world affairs. Every evidence points to a constantly rising place. This country's influence may well be paramount; its power for good may be beyond our fondest dreams.

As the time for the two-hundredth anniversary approaches, there will undoubtedly be increasing interest in a memorial with which to mark so momentous an event. For our greatest men we have erected all sorts of monuments and buildings. For one man such a memorial may well be enough. Yet even our greatest cannot approach in importance the nation itself, and all the people who have lived, do live, and will live in it. No building, no temple, no tower, however inspired, however beautiful or grand, could possibly equal, or even adequately express, the significance of the occasion.

There is, indeed, only one physical memorial that could possibly measure up to the grandeur and solemn significance of the event. This is represented by the physical country itself; its mountains, forests, rivers and lakes; its animals and plants; its parks and wilderness; everything else that makes up and adorns this land of ours.

It will be said that all these things exist now. It will be asked how, then, they may be made into a memorial.

Of course they exist, but only in such condition as decades of waste and misuse have left them. One has only to look about to see mountains disfigured; forests slashed and never restored; streams, lakes and

harbors filthy with pollution; wild flowers and wild animals fewer, with some species gone forever; highways lined with disfiguring billboards, roadside slums, auto graveyards and dumps; many towns and cities ugly and run-down. Physical America today is certainly no satisfactory memorial to our country.

Indeed, the only memorial suitable for the occasion would be a country restored—or developed, if one prefers—to a point as nearly ideal as possible. Of course, not everything one might hope for could be accomplished. Nothing can bring back the passenger pigeon or the ivory-billed woodpecker. The progress that has been made in the last fifty years in our forest and park programs, however, is sufficient testimony as to what should be achieved during the next thirty years in fields in which we have actually lost ground.

What should be the ideal goal for a proper bicentennial memorial? Certainly it should seek the following:

Well-cared-for forests growing on all the land best fitted for trees; enough publicly-owned forests to provide reasonable recreation for everyone; wilderness areas preserved in all possible parts of the country.

Mountains and hills cleared of disfigurements and reforested where desirable, with a proper balance between those serving mechanized visitors and those saved for hikers and climbers.

Soil restored; erosion checked; farms productive and attractive, with thrifty field crops and orchards.

Clean streams, lakes and harbors, free from all pollution of sewage and industrial wastes, their waters sparkling and clear. Unnecessarily drained ponds and marshes restored; marshes protected as wildlife habitat.

Highway environs at least clean; free from billboards, wrecks and slums; roadsides attractive with trees, shrubs and flowers.

Bird and mammal populations increased or maintained; more habitat for the various species; better protection for species in danger from hunting, trapping, and all commercialism; widespread popular understanding of the needs and merits of wildlife.

Better protection and understanding of wild plants, especially of native species now reduced in sections where they were once abundant.

More understanding and wiser use of fishes; restoration of native species that have suffered by unwise introduction of alien species that do not belong here.

Finally, and, perhaps, first, a people better educated adequately to understand and appreciate the beauties and values of all natural resources; proper education reaching into every part of the country.

This may be only a partial list of goals to be sought. Yet it is long enough to indicate both the extent of the task and the grandeur of the goal. Although much has been accomplished, much more is left to do. It will have to be done in many different ways—by education in and out of schools; through magazines, press, radio and motion picture; by constant attention on the part of persons, organizations and institutions interested; by intelligent and well-directed publicity; by leadership that will show the people how to make their wishes effectively known; by wise legislation; by the slow, patient contribution of many people, each individual doing his bit to make his part of the country, be it suburban lot or great ranch, as beautiful as possible. To achieve such goals, the government will have to give much help; yet it cannot be left solely to the government. Often, in fact, the people may well have to lead the government. Through it all, the goal must ever be kept before the eyes of the nation.

It is a tremendous task. Thirty years are all too few in which to accomplish all that must be achieved. That is why this year, the one hundred and seventieth anniversary, is a good time to begin; it is a time for those who have long since begun, to set a definite time and a definite goal.

There will be many obstacles, many doubters. There may even be those who will say that, with the atomic bomb and other inventions, it is useless to plan as many as thirty years ahead; the country may be destroyed; the United States may be so changed as to be difficult to recognize. Yet it is only by faith in the future that we can live at all. Everyone who receives an education, or takes out a life insurance policy, or has a family, is counting on this country's existing and developing for thirty years and many more. Furthermore, a goal of this kind might well become an incentive to work harder and to struggle more to keep this country peaceful, vigorous and true to its highest ideals.

It will be a hard fight, but the goal is a worthy one. Is it too much to ask (Continued on page 358)

Retrogression

Subterranean cities will be man's only defense against the atom-bomb, says aerial armaments expert.—News item.

By LEAH BODINE DRAKE

The spent fox slinks along the hill
To win the refuge of his den.
From fury of the hounds and men
The earth gives sanctuary still.

The hare leaps from the sunny rock;
She slips beneath the naked land,
And in the bulwarks of the sand
Forgets the shadow of the hawk.

Now toward a sky turned strangely feral
Mankind must bend his rigid back
And seek the scorned and ancient black
Womb of earth from man-made peril.

To crouch there in that dusty house
Where not for ages has he lain;
And death must look for him again
Beside the hedgehog and the mouse.

Bindweed is one of America's most costly weeds. Its greedy habits of growth cost our farmers millions of dollars a year. Here a bindweed plant looks healthy.

PHOTOGRAPHS FROM DOW CHEMICAL COMPANY

Seven days after the bindweed had been sprayed with 2,4-D it was in this dejected condition, drying up and disintegrating from the effects of the weed killer.

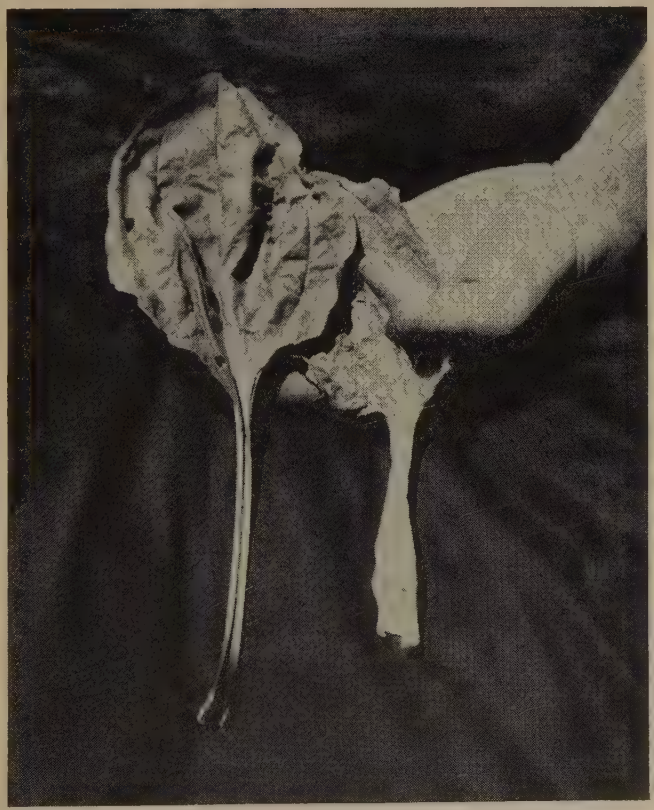
Weeds Away!

By ANDREW S. WING

Executive Secretary, The National Garden Institute

WEEDS HAVE never been noted for their host of friends; now they have lethal enemies. These are chemical killers that promise a turn in the tide of battle against plant pests of lawn and golf course, pasture and farm. They hold up a light of hope to the legion of hay fever sufferers, sound doom for poison ivy, and point to a black future for a long list of noxious weeds that cost the farmer many millions and the home owner much grief.

While the millennium has not yet arrived, and you cannot dash out and blithely spray vegetable garden and flower border with the new chemical weedicides with assurance that nothing but weeds will suffer, the killers will help. Hand and hoe will still be needed, but there is still plenty of cheer in the news about the interesting group of chemical weed swatters.

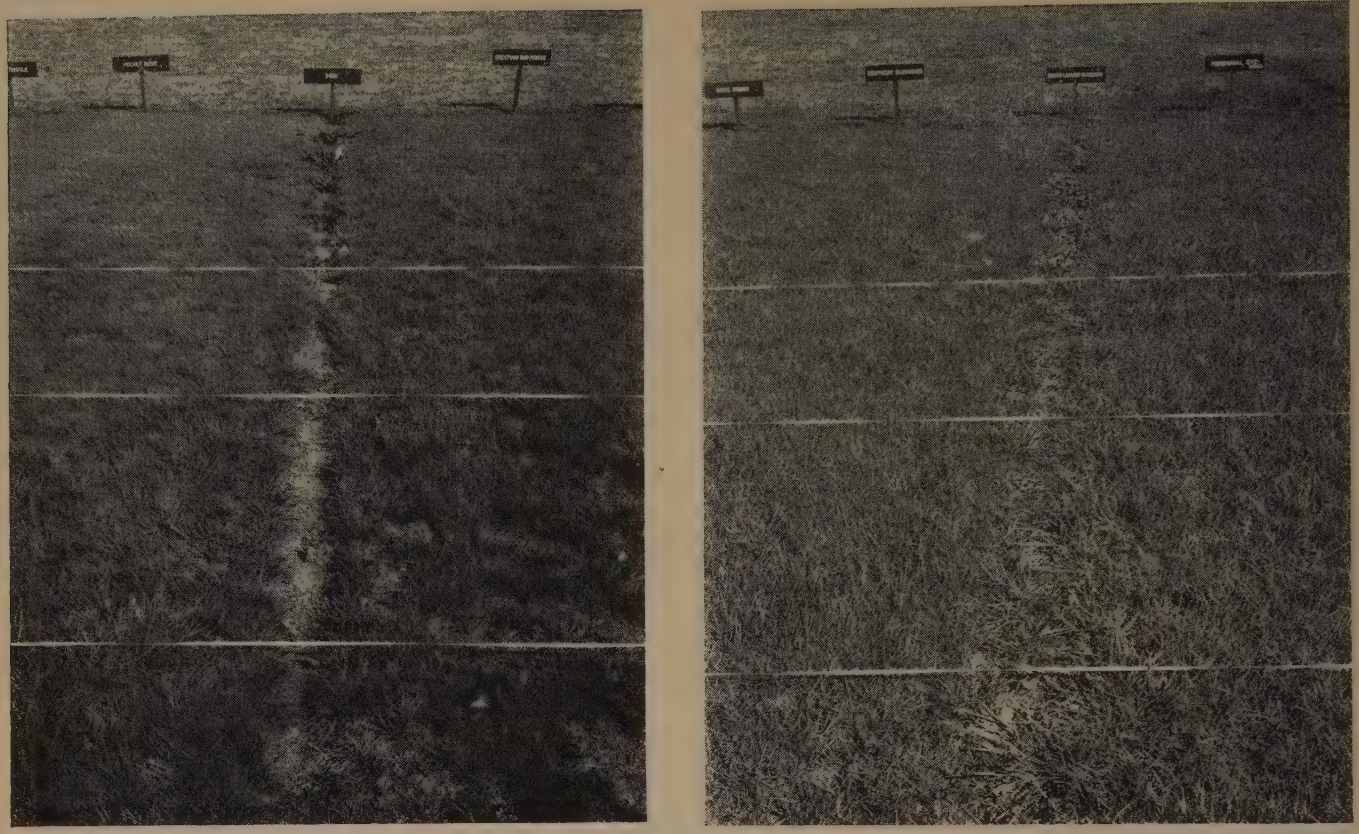


PHOTOGRAPH FROM DOW CHEMICAL COMPANY

The effect of 2,4-D on plantain. Note the stem of the stalk at the right. It has been thrown physiologically out of whack, the stem swelling. The stalk at the left was not treated with weed killer.

Chiefly in the spotlight stands 2,4-Dichlorophenloxyacetic acid, shortened, for obvious reasons, to 2,4-D. Weed killers are, of course, not new. Such things as common salt, calcium chloride, crude oil, coal tar and various strong chemicals have been used for many years. Flame throwers have been pressed into service against weeds. But only recently have selective weed killers been developed to the point of safety for public use, and 2,4-D heads the list.

A Cornell University research worker at the New York State Experiment Station was seeking a nemesis for bindweed, which costs the farmer millions annually. He found it, and controlled experiments followed, proving that 2,4-D does a pretty good job of picking its enemies, killing some plants and not injuring others. Among the



PHOTOGRAPHS FROM BROOKLYN BOTANIC GARDENS

Experimental plantings of different species of grass and noxious weeds. At the left dock was planted between velvet bent and creeping red fescue, while, at the right, plantain was introduced between Kentucky bluegrass and perennial rye grass. Sprayed with 2,4-D, the weeds departed.

plants that are immune to the chemical are most members of the grass family. Those that succumb include most of the weeds common to lawns, among them wild garlic, plantain and dandelion. It is interesting to note that 2,4-D is not a poison in the usual sense. In fact, it is one of the so-called synthetic plant hormones. Used in weak solution, it will produce tomatoes without pollination—seedless tomatoes. Similar hormones are used to cause cuttings to take root. It is, however, not the best hormone to use for that purpose.

Just what 2,4-D does to weeds is still a subject of varied interpretations. It does not, however, merely burn off the top of a weed plant and kill immediately. It is more insidious than that, apparently upsetting the whole mechanism of the plant, giving it a false sense of well-being. The weed takes on a sudden vigor, but this is only temporary, for it soon begins to distort, disintegrate and die, roots and all.

So 2,4-D still holds some mysteries, and it is not yet to be sprayed willy nilly around your vegetable patch or flower border, because it will kill useful plants; generally speaking, most broadleaf plants. The weedicide is also injurious to Triple-A Bent grass and to Red Top, but Kentucky blue and other grasses, such as are found in the usual lawn grass mixture, are not harmed. Unfortunately, the chemical is not effective against that villain of the turf, crabgrass.

It is best to follow directions of the manufacturer —of which there are a number of reliable concerns— in using 2,4-D. In general, it has been found best, at the Brooklyn Botanic Garden and other scientific institutions, to apply the solution of 2,4-D as a fine mist when the weather is warm—70° F. or higher. One application in mid-June should be sufficient for the summer. Remember that 2,4-D does not kill weed seeds that are in the soil, or which the wind may blow in. Spray when the sun is shining, and early in the day, so that there will be a long period of sunlight afterwards. Poison ivy can be killed with 2,4-D, but in the shade it may survive.

The best way to apply this weedicide on a small lawn is with one of the 3-gallon knapsack sprayers. On a large lawn or golf course a power sprayer is needed. Remember that a mist is better than a soaking spray, and be careful not to let the spray blow over on useful plants nearby. If used carefully in a perennial border and while the plants are small, weeds may be killed without damaging the flowers. However, Dr. L. W. Kephart of the Agricultural Research Administration warns that if annuals are to be planted in treated ground, injury may result from residues of 2,4-D in the soil. A good deal is yet to be learned about the residual effects of 2,4-D, but apparently there is no danger in using it on lawns. Dr. Kephart suggests that a good way to use 2,4-D on lawns is mixed dry with fertilizer in early spring at the rate of not over three pounds to the acre. A

Inspecting a 2,4-D-treated patch of grass that has been ridden of dandelions, plantain, clover and other plants, yet these still prevail in the plot next to it.

PHOTOGRAPH FROM DOW CHEMICAL COMPANY

fungicide might be applied at the same time if there is danger from turf diseases. Remember that 2,4-D will also kill the white Dutch clover in your lawn.

Since 2,4-D has such a lethal effect on most plants, great care must be used in washing off all traces of it from sprayers and other utensils used in spraying vegetables or other plants. The slightest trace left in a sprayer may have fatal results. For that reason, some experts recommend that a separate spraying apparatus be used for 2,4-D. Undoubtedly this is the safest practice to follow.

Besides this new killing champion, other weed killers are deserving of attention. One of these that is effective, and will kill even crabgrass, is sodium chlorate. This can be safely sprayed on lawns if carefully applied, but government specialists caution against its indiscriminate use because this chemical, while perfectly harmless in its original container, becomes violently inflammable when mixed with organic matter, including dead grass, weeds or cotton clothing. The safest way to kill crabgrass is to shade it, either by cutting the grass high, or by covering it with tarred paper, canvas, old rugs, and such. This also browns out the good lawn grasses, but they will soon recover, while the crabgrass, being an annual, can only come back from seed.

Dr. Kephart suggests the use of a blowtorch on crabgrass in small lawns in early May. The flame from the torch need be held on the crabgrass for only an instant, since it is merely necessary to wilt it down. The bluegrass is also wilted down, but will soon recover from the roots. This will not entirely eliminate crabgrass, but is useful in badly infested spots.

On a tennis court, driveway or gravel paths, calcium chloride, or even coarse rock salt, may be used effectively, but these are good for only one season as rains wash them out of the ground. Tar or crude oil is effective for highway use. Various oils, including No. 2 fuel oil, white kerosene and Stoddard's solvent, may be used safely to kill weeds without danger to young plants of carrot, parsley, parsnip, or celery. These materials should never be used on any other crops, however. Just the proper amount of oil must be applied, and on carrots treatment should be made before the seedlings reach the true-leaf stage, otherwise the flavor may be affected. Not having tried this method, it sounds a bit tricky to me, but it is being used successfully, according to authorities.

Poison ivy is a subject in itself. This plant villain causes untold misery and suffering every year to millions of people, and no one is absolutely immune. I used to think I was until I went around brazenly pulling up the stuff by the roots. The result was a swell case of poisoning, and I have been wary of this rascal ever since.

Remember there are three related plants, poison-ivy, poison-oak and poison-sumac. All are members of the genus *Rhus;* all have similar leaves except that poison sumac has seven or more leaves to a stem while the other two have only three. The common poison-ivy is a vine, and is found in every state except Nevada and California, but other varieties may be found in these states. The true poison-oak is a shrub or vine, and is found chiefly on the Pacific Coast. Poison-sumac is a shrub that is found in swampy places in the eastern half of the United States. A good thing to remember is that all members of the sumac family that have red berries are harmless; poison-sumac has whitish berries—similar to poison-ivy—that hang down. There is an oriental variety, too, that has been introduced, called the Japanese lacquer tree. From this tree, Japanese lacquer is derived. Even the lacquer is poisonous to some people, and, since the leaves are toxic, it should *never* be planted.

The toxic principle is the same in all these plants. It is officially known as a "nonvolatile phenolic substance called urishiol," and it is found in all parts of the plant from seeds to roots. The most danger, however, is from the green leaves, although the smoke can be very poisonous to eyes and throat. I well remember my father getting a dose of ivy poisoning while burning brush when (Continued on page 383)

The Glastonbury thorn is symbolic of our Lord's nativity, blooming during the Christmas season.

The butterfly represents the Resurrection, and the stages of the insect's life have symbolism.

The pelican is symbolic of the atonement of our Lord because of the legend about the bird.

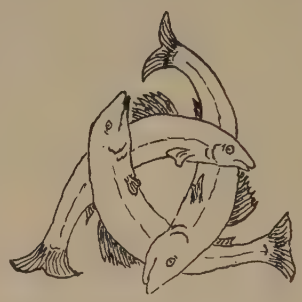
The pomegranate is often the emblem of royalty, hope, immortality and the Unity of the Church.

Nature in the Christian Symbols

By SISTER M. HENRIELLA, F.S.P.A.

Since Nature is one of God's creatures, it was only logical that the symbols used by the early Christians as signs of their religion should have been so highly characterized with simple, emblematic fauna and flora. It is true that the symbols of the early Christians were simple with a simplicity that characterized those who used them; but the emblems embodied the profoundest meanings and the most abstract ideas of the Faith in which they believed.

The Fish, which stands for Christ, is the symbol of greatest importance and was used as early as the first century. The idea of an emblem of the fish resulted from taking the first letter of each of the five Greek words meaning "Jesus Christ, Son of God, Saviour," and combining them to form *Ichthus*, a Greek word meaning fish. The symbolic fish, of whose true meaning the pagan mind was ignorant, was used as a secret code to identify Christians, and their places of worship, in the early ages of persecution.



Three fishes are symbolic of the Holy Trinity; one fish of the Second Person.

The snake entwining the tree of life means the fall of mankind.

The symbol of one fish signified the Second Person of the Blessed Trinity. The symbol of three fishes represented the Holy Trinity, since all Three Persons figure in man's salvation—God the Father, creating; God the Son, redeeming; and God the Holy Spirit, sanctifying mankind.

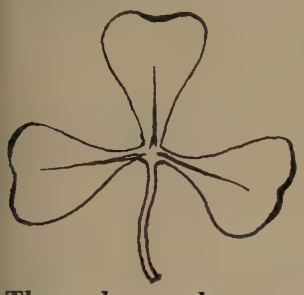
For centuries, the snake has been considered symbolic of Satan, and the fall of mankind is represented by the serpent entwining the tree of life. The tree has always been found in literature. It is a symbol of life, death, and resurrection. The traditional apple is seen hanging on the tree, and the fruit serves as a constant reminder of the Fall of mankind. The universality of man's fallen condition is depicted by the symbolic snake encircling a globe.

Because the lily is one of the emblems of purity, it is used to symbolize the Virgin and the Annunciation. Many types of lilies are used in the symbols, but the *Lilium candidum*, often called the Madonna Lily, is used in almost all pictures of the Annunciation. Since the lily is a symbol of virginity and purity, it is used to symbolize the Virgin Birth, hence it is most often pictured without stamens, either growing in a pot or held in the hand of the Virgin or the Angel Gabriel, who brought the message that she was to be the Mother of God to Mary. Many authorities are of the opinion that the *fleur-de-lis* is a conventionalized form of the *Lilium candidum*. It is true that the *fleur-de-lis* is the symbol of the French kings, but they studied and drew from the Christian symbols when designing their emblem. In many symbols we find other types of lilies; for example, the Easter lily. Since the lily blooms during the Easter season, it is only natural that it should be chosen as the symbol of our Lord's resurrection.

Even as the Easter lily bursts into bloom at Easter, so the Glastonbury thorn flowers during the Christmas season, and is, therefore, used as a symbol of our Lord's nativity. F. R. Webber, in his book, *Church Symbolism*, says that the ancient thorn-tree, *Crataegus oxyacantha praecox*, which stands just within the gates of the great ruined abbey at Glastonbury, Somersetshire, England, is believed by many to be a descendant of the thornwood staff planted by St. Joseph of Arimathaea. He is said to have introduced Christianity into England in the year 63 A.D.

The pomegranate is often used in different emblems to signify royalty, hope, immortality, and the unity

Many types of lily are used in Christian symbolism, particularly the Madonna lily.



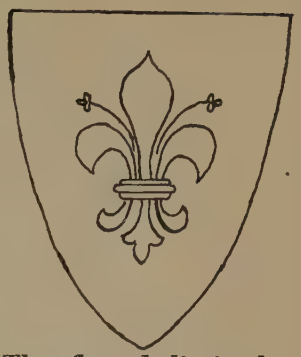
The shamrock was chosen to represent the Father, Son, and Holy Spirit to pagans of St. Patrick's Day.

of the Church. As pictured here, the pomegranate symbolizes the Resurrection. The fruit is bursting to give forth its fruit, just as our Lord burst the tomb on Easter day and came forth. The power of our Lord is symbolized by the bursting of the seed coats by the fruit of the pomegranate. There are some authorities who are of the opinion that the bursting pomegranate represents the resurrection of all believers.

Perhaps no symbol is more widely known and loved than the Shamrock. The legend of the shamrock is familiar to old and young alike. St. Patrick used the shamrock to prove to the pagans that the Father, Son, and Holy Spirit are three persons, but one in essence. Just as the three leaflets, equal in size, are supported on one stem to signify a simple leaf, so the Trinity expresses the union of three in one Nature or God.

No emblem is more symbolic of the atonement of our Lord than the Pelican-in-Her-Piety. Legend has it that the pelican tears open her breast in time of famine to feed her young with her own flesh and blood. She gives her life that her brood may live, even as our Lord shed His blood on the Cross that all mankind might live and enter into life eternal.

In the butterfly is signified the Resurrection of our Lord and our own eternal life in Jesus Christ. Man, in his fallen state, is represented by the larval stage of the butterfly as it grapples in the dust. The resting stage of the butterfly in its chrysalis is symbolic of the grave in which our body will be placed in death. Then as the chrysalis bursts its entwining case and soars forth as an entirely different appearing insect, so, too, man will come forth from the grave on the last day, and with his glorified body united again with the soul, will go forth to dwell in a Heavenly abode forever.



The *fleur-de-lis* is the symbol of the French kings, but they drew upon Christian symbols for it.

A snake encircling the globe represents the universality of man's fallen condition.

And so, one could go on tracing the relations between Nature and the Christian symbols. Regardless of what symbol one studies—be it the swallow, otter, unicorn, daisy, or the vine—one would come to realize that the choice of subjects for the symbols was not merely arbitrary or conventional, as too many think, but simply the expression of a fundamentally natural relationship between the Creator of Nature and Nature itself.

To study the symbols is an education in itself, and one that will contribute greatly to a Christian way of living. Perhaps Thomas à Kempis was studying the symbols when he wrote: "If thy heart were right, then would every creature be to thee a mirror of life and a book of holy doctrine."

★

Storm Worship

By E. V. GRIFFITH

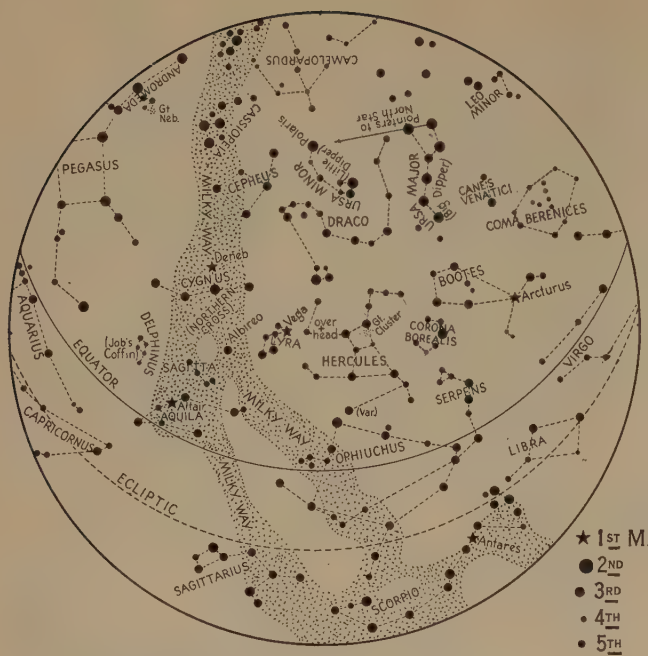
Something inside me, primitive, uncouth,
Takes brute possession and enslaves my form
Each time it rains: some savage other-self
Stirs deeply in me at approaching storm.

Always when in the heavens dark clouds mass,
I stand here with a breathless kind of wonder,
Half savage and half brute, and scan the sky,
Anxious for wind, anticipating thunder.

Inside I tremble. Something stirs and shakes
My body, as demented thunder crashes
Across the sky, and clouds blot out the sun,
Goaded by shrieking wind that flays and lashes.

Always I want to race outside and stand,
Catching the smell of thunder in the air,
Eager for lightning rending skies, while leaves,
Wind-borne, strike fiercely at my face and hair.

Something obsesses me, and, fierce and wild,
I laugh and laugh like someone gone insane,
And thrust myself against the sagging sky,
And throw arms up toward the drenching rain.



9 P.M., August 1; 8 P.M., August 15.

9 P.M., Sept. 1; 8 P.M., Sept. 15; 7 P.M., Sept. 30.

To use these maps hold them before you in a vertical position and turn until the direction of the compass that you wish to face is at the bottom. Then, below the center of the map, which is the point overhead, will be seen the constellation visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south. Time given is Standard Time.

August-September Skies

By ISABEL M. LEWIS

DURING this two-month period Mercury and Saturn will be in the eastern morning sky, and Venus, Jupiter, and Mars, in the evening sky, will all be approaching the western horizon. Each of the three last-named planets will also come into conjunction with the other two in this period.

Mercury is in inferior conjunction with the sun on August 2, and then passes to the morning sky. It will be at its greatest western elongation on August 20, at which time it will be 18½ degrees west of the sun. Only for a week or so before and after this date may one expect to find it in the morning twilight. On the date of elongation Mercury will be about 15 degrees above the eastern horizon at sunrise, and it will be only slightly less brilliant than Capella or Vega. This little planet is noted for being the smallest, the nearest to the sun, and the most rapidly moving of all the planets. For many years search was made for a planet whose orbit would lie between the planet Mercury and the sun, or an intra-Mercurial planet, especially at the time of a total solar eclipse, but it is almost a certainty by this time that no such planet can exist. It would have to be a very minute body indeed to have escaped detection all these years. It is by no means so certain, however, that no trans-Neptunian planet, comparable to Pluto in size or even larger, exists on the outskirts of the solar system.

Saturn passed to the morning sky on July 21, when it was in conjunction with the sun, and its position is steadily improving for observation before sunrise. It is now in the constellation of Cancer, after being in Gemini most of the year. By the middle of August it will rise about two hours before the sun, and will be about 17 degrees above the eastern horizon at sunrise. By September 15 it will rise four hours before the sun, and be midway between the horizon and the zenith at sunrise. It will then be a brilliant and beautiful object in the morning sky.

Venus will be at its greatest eastern elongation on September 8, when it exhibits the phase of a half-moon in the telescope. In August its phase is still that of the gibbous moon and its disk more than half illuminated. It is rather low in the west during this period, but its brilliance, far exceeding that of any other planet, makes it a conspicuous object in the western sky. Venus will pass very close to the first magnitude star Spica in Virgo on August 30. An excellent time to identify a star or planet is when it is in conjunction with, or close to, a well-known or exceptionally brilliant object such as Venus. In addition to its conjunction with Spica, Venus will come into conjunction with both Mars and Jupiter during this

period—on August 9 with Mars, and on September 3 with Jupiter.

Mars has rapidly lost the brilliance that it possessed at the time it was nearest to the earth in January. It is now no brighter than Polaris, a star of second magnitude, and much inferior in brightness to Antares in Scorpio, which it resembles in color and far exceeds in brightness at the times when it is nearest to the earth. By the middle of August Mars is only about 15 degrees above the western horizon at sunset, and it then sets about 1½ hours after the sun. On the date of its conjunction with Venus, August 9, the two planets are about one-half degree apart with Venus south of Mars. In September Mars draws in so close to the sun that before the end of the month it is found with difficulty in the evening twilight. On September 15 it is only about 10 degrees above the western horizon at sunset, and passes below the horizon an hour later. On September 24 it will be in conjunction with Jupiter and one degree south of the giant planet.

Jupiter will be rather low in the southwest at sunset early in August, setting about 2½ hours after the sun. By the end of September it will be visible in the evening twilight low in the southwest for less than an hour after sunset. Early in August Jupiter is very close to the first magnitude star Spica in Virgo. It will be interesting to observe its change in position relative to Spica during August and September, when it will pass from a point close to the star on the northwest to a point ten degrees or so nearly due east late in September. Jupiter will be about 3½ degrees due north of Venus at time of conjunction with it on September 3, and a degree north of Mars when the two planets are in conjunction on September 24. At this time they will be close to the southwestern horizon at sunset, and Mars will be difficult to find in the glare of the evening twilight.

August is the month when meteors are observable in considerable numbers. The Perseids, which appear in greatest numbers each year on August 10-12, are not closely bunched but distributed along their orbit for a considerable distance. As a result, the earth encounters members of this annual shower for a period of two or three weeks from the latter part of July to the middle of August, or later. The Perseids are swiftly-moving and brilliant, and, as their name indicates, the radiant of the swarm lies in the constellation of Perseus, which, in August, rises in the northeast near midnight. So the best time to observe the Perseids will be after midnight, and the richest display should be near the end of the second week. Observations of meteors are important because they give us information as to the nature of matter existing in interplanetary space. They also reveal facts of interest and importance regarding the height and density of our own atmosphere. This is an interesting field of observation for amateurs, and there are a number of societies for the observations of meteors in this and other countries that are glad to send instructions, and printed forms for recording results, to those who wish to make such observations.

Meteors are usually entirely consumed by friction with the earth's atmosphere. It has been noted that the large masses of nickel-iron alloys, or stony-iron compounds, weighing, in exceptional cases, hundreds of pounds and known as meteorites, rarely, if ever, appear at times of periodic showers of meteors. It is possible that they may have an entirely different origin.

The silent, swiftly-darting meteoric particles, which flash to incandescence for a brief second or so as a result of their encounter with the earth's atmosphere, are mere cosmic dust weighing at most only a few grains. Showers of such particles belonging to swarms such as The Perseids are known to be, in some instances, the debris of a disintegrated comet moving in the orbit of the original comet, and encountering the earth each year at the point where the two orbits intersect. The earth also encounters daily stray particles of matter of meteoric origin, all of which points to the existence in interplanetary space of much cosmic dust. This is shown also in the phenomena known as the zodiacal dust and the counter-glow, which are exceptionally brilliant and conspicuous in the tropics. They are attributed to sunlight reflected from swarms of particles of cosmic dust revolving around the sun near the orbit of the earth.

Autumn in the northern hemisphere will begin this year on September 23, 10:41, A.M., Eastern Standard Time, at which time the sun will be on the equator going south. For the southern hemisphere this is the beginning of spring.

Mount Wilson Telescope

By MARCUS Z. LYTLE

The sanctuary that was still and dark,
Except for one dull-burning light,
Begins to tremble as the ceiling parts
To show the splendor of an August night.
A warm wind, filled with pine and juniper,
Blows sweetness through the girdered telescope,
The silhouette is turned, the camera set,
And all the watchers hush their eager hope.
A nebula beyond the farthest star
Imprints itself behind the shutter bar.

The School Page

Edited by E. LAURENCE PALMER

Professor of Rural Education, Cornell University,
and Director of Nature Education, The American
Nature Association

LILY PONS OR LILY PONDS?

AT THE FINAL meeting of a university course in camping, a director of a large municipal camp was discussing his problems. The advantages of camping and learning about the outdoors in small groups had been considered, and, apparently, the merit of such technique has been recognized. But the initial statement of the director of the big camp indicated that, while he appreciated the advantages of working in small groups, it was simply out of the question in his situation. Children by the hundreds came to him, and neither he nor anyone else had the time or opportunity to gain a better understanding of their individual backgrounds.

When the director of the large camp was asked if he had any sleeping bags as a part of his camp equipment, he explained that the bivouac type of camping was impossible in working with such groups; that the expense of such equipment for such a large group was prohibitive. (It was reported that the army surplus of sleeping bags was being burned at the time.) The director explained that, with such large groups to deal with, it was financially impossible to engage experienced counsellors at respectable salaries to work with efficient small groups.

Having disposed of the impossibilities of doing a good job under the big unit set-up by working with small groups, our director of mass education naturally went on to extoll the glories of his system. Instead of offering children the experience of resting in sleeping bags under the stars, he saw to it that the children under his direction were comfortably housed in cabins under weatherproof roofs. Instead of letting the children learn how to cook a palatable meal over a campfire without getting too much smoke in the eyes, he outlined the splendor of the cafeteria equipment he had been able to get for his camp. Instead of providing guidance where children might explore relatively virgin territory under the direction of good leaders working with small groups, he explained how, with the funds at his disposal, he was able to hire the best leaders in the country to direct en masse waterfront activities, calisthenics and competitive sports. This, mind you, was to provide a new experience and recreation for children who spent most of their year living in relatively crowded conditions.

The crowning glory of this mass production-line system, according to our camp leader, was the fact that he was able to hire Lily Pons to come to his camp and sing for the group. This, he emphasized, was possible because of the large budget at his disposal, even though he had earlier claimed that he could not adequately staff his camp with more average leadership capable of working with small groups because of the prohibitive expense. Somehow, I could follow neither his logic, his economics, nor his educational philosophy. I like to hear Lily Pons sing. She is one of my favorites, but I defy even her to match in beauty of person or of voice the hermit thrush that sings in a place to which I can take almost any group at almost any time during the camping season, providing the crowd is not too large and that they know how not to interfere with the temperament of my feathered impresario. I doubt very much if my friend the director ever sat with a small group as the sun went down and listened to the calm, unhurried recital of a hermit thrush, or even of a wood thrush. In my judgment, one of the things we need from our educational systems that mould the urban youth is something that will, at intervals at least, let him forget the strife that goes with city life; something free of the stimulation of competitive games; something that will be free of the glorification of the works of man or of woman.

In my judgment, the money spent for Lily Pons' trip to a summer camp for a one-night stand might better have been spent for the creation of a chain of lily ponds, which, through the season, would yield many glimpses of darting dragon flies during the day, and many bullfrog choruses to lull the campers to a peaceful sleep during the night. I may have an odd philosophy, but I would turn off any radio concert or any phonograph record I ever heard to listen to a bullfrog chorus punctuated by beaver tail slaps on the water, or green-frog "chungs" in a natural setting. There are too many camps with elaborate swimming pools and no lily ponds; too many with spectacular dining halls and no high "overlook"; too many with an abundance of concrete tennis courts and baseball fields and no wildlife sanctuaries; too many with mass meetings and no opportunity for individual communion with the many inspiring things life in the open has to offer. We do not need to have so much done for us. We need to do more for ourselves. We do not need to have experts sing for us, or even to sing in campfire choruses if there is no song in our own hearts, no song that does not rise spontaneously rather than tag along under the arm-swinging direction of a cheer-leader.

This criticism cannot be directed wholly to camping education. It has its counterpart in what our schools offer through the year. Time was when children had the opportunity to work in small groups in laboratories under conditions where there was a reasonable give and take between pupil and teacher. Then along came some educational researchers, who published serious sounding studies proving that by the mass technique of the demonstration method, or by the modern visual aids, we could teach sometimes better to large groups than we could to small groups. These studies were interpreted to mean that, because some desirable changes could be brought about in this way, all educational improvement could be brought about in this way. The manufacturers of sensory aids and of demonstration equipment, the educational moving picture companies, saw an opportunity for themselves in this change and whooped her up a bit. The school boards saw that under this new system they could dispense with the small laboratories and laboratory equipment in favor of huge auditoriums, a step that, incidentally, had a favorable impression on the taxpayer. So we have been stampeded away from lily ponds to Lily Pons; away from individual instruction to the production line; away from independence of effort to chain-gang activity. We let the other fellow sing for us, play for us, pay for our leisure, and, if the power to tax is unlimited, we are likely to let the other fellow support us. Whether or not this swing from independence to dependence is to be desired obviously is a matter of personal opinion, but to the writer the goal must be the development of individual strength, not of individual weakness. Since the strength of the whole depends on the strength of its component parts, our future is largely dependent on the extent to which we depend on others at home, in school and in camp. It is to be hoped that we make the right decision now to guarantee happy living in the future.

WEEDS AWAY!

(Continued from page 377)

I was a boy on the farm. It is no fun, I can tell you.

The best way to kill poison-ivy, and its pals, is to apply a fairly new chemical known as Ammonium sulfamate or Ammate. It is not dangerous to use and does not harm the soil. It is generally considered more positive in action than 2,4-D. Other chemicals that are effective are borax, carbon disulphide, creosote, fuel oil, sodium chlorate, and sodium arsenite. Most of these substances are also more or less harmful to other plants, but they may not linger in the soil more than a season. For specific information write the U. S. Department of Agriculture for Farmers' Bulletin No. 1972. Whatever you do, do not take chances with poison ivy. Small plants growing from seeds scattered by birds may be pulled up by hand, or a rake, but wear gloves when you touch it or else you may rue it.

Quack or "witch" grass is another bad plant that is difficult to eliminate on the farm, or in the garden, once it is established. In a home vegetable garden smothering is perhaps as good a way as any. I have struggled with a quack-infested victory garden for two years, and have paid my respects to this rascal on many a hot summer day by wheel plowing and hand hoeing. The root-stalks run underground, and every section is capable of starting a new plant, and immediately. However, if you will stretch strips of tarred paper between rows these will smother out most of the pest in a season, and serve as a moisture-conserving mulch at the same time. Never give this "sucker" a break; pull it up by hand or dig it out whenever you find it rearing its green head.

Remember that clean cultivation is one of the best ways to control weeds. Never let them go to seed. In New York City a campaign is going on to control ragweed by the use of 2,4-D. However, it is pointed out by Dr. George S. Avery of Brooklyn Botanic Garden that the treatment is good for only one season because ragweed seed can live in the ground for forty years.

Then there is that lovely little plant the dandelion, which bares its golden head to the spring sun the world around. The dandelion has a tough tap root and it can live for ten years or more. Each dandelion plant sends up from six to eight flower heads a year, and each flower will produce around 250 seeds. As everyone knows, these seeds travel far and wide on the wind. A heavily-infested lawn will produce an average of 50,000 seeds per square yard. Obviously, therefore, it is not enough to eliminate the dandelions from your own lawn; nearby lawns and vacant lots must also be kept free from this and other wind-borne weeds.

Chemical weed killers will probably never entirely abolish the need for cultivation and hand weeding. But they mark a great step forward. As Dr. Avery has well said in a recent issue of *Flower Grower:* "The future of selective weed killers is bright. While there are now only two (the other is closely related to 2,4-D), there should be many such preparations in a few years, all of them with different qualities. Selective weed killers are of great importance to agriculture and research on them should proceed swiftly. The home gardener will be one of the beneficiaries."

SMITHSONIAN

(Continued from page 356)

become one of America's foremost malacologists, as well as the biographer of Baird. It would include Tarleton H. Bean and Theodore N. Gill, ichthyologists; Frederick W. True, mammalogist and head curator of biology; Charles D. Walcott, secretary and geologist; George P. Merrill, mineralogist; and Richard Rathbun, assistant secretary and marine zoologist. It would include such names as Elliott Coues, brilliant student of zoology, who collaborated with the Smithsonian for many years, was early in the front ranks of ornithology, and, with Thomas M. Brewer and Baird, produced an outstanding "History of North American Birds," and, on his own account, numerous and voluminous works on exploration and natural science; and Charles W. Richmond, who was content to work behind the scenes but who knew more about ornithological literature than probably any single man in the world. And finally, in point of chronology (for he died as recently as 1943), it would include the titan, Leonhard Stejneger, the great biologist who spent a lifetime in the service of the Smithsonian, and typifies as well as any other we have named the special kind of naturalist that the Institution has produced.

All these have lived and worked in that hundred years since 1846—the year of decision—when the United States Congress established the Smithsonian Institution. And now a new century begins just as science is entering upon a new era. The first hundred years have seen great things, indeed, but somehow time opens rather than closes the vistas to fresh fields of knowledge. Every gap that is closed seems to open up new and greater unknowns in man's feeble efforts to understand the universe. Certainly, in its second century, there will be no lack of opportunity for the Smithsonian to continue to serve mankind in the way that James Smithson dreamed.

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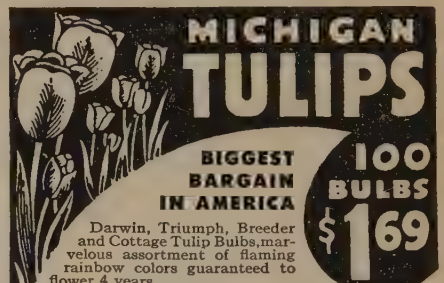
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Camera Trails

By EDNA H. and WILLIAM J. EVANS

THIS SUMMER tens of thousands, if not millions, of Americans will take vacations. The majority of them will take a camera and film along. Shutters will click from the Maine woods to the California coast, from Rocky Mountain heights to Florida's sea level beaches. Family groups and individuals will pose all over the landscape—seriously, woodenly, humorously—standing, sitting, swimming, riding, boating, golfing—the list of poses and activities could go on indefinitely.

Later on, most of these snapshots will find their way into albums, to be displayed on winter evenings for the benefit of more or less interested guests, while the participants relive their vacation fun.

All this is very well. We are happy that people can get enjoyment out of their cameras, that vacation pleasures can be recorded for re-enjoyment on film and sensitized paper.

But the thing that makes us writhe, and even grind our teeth, is the way so many vacationers ruin their pictures by planting somebody haphazardly right in the middle of a really attractive bit of landscape. Time and again they will do it. There is Cousin Annabelle standing on the edge of the Grand Canyon—look carefully and you can see just a few inches of that magnificent gorge around the edge of Annabelle's slacks. And here is Cousin Roscoe feeding the cute bear in Yellowstone—that blur in the right hand corner is the bear.

Then there is Uncle Caleb in the petrified forest—at least that is where the picture was snapped, although not a bit of the scenery shows. Aunt Martha and Second Cousin Bernadine look very coy hanging over that rustic bridge in the Great Smokies, but they could be standing by the fence in their Cleveland back yard, for all their surroundings reveal. That beach where the twins are frolicking could be at Waikiki, Miami, Acapulco or Mud Lake because there is not a distinguishing feature visible.

And so it goes. The average summer vacation snapshot is as dull and undistinguished as a piece of second-hand fly paper. They all look alike, and heaven pity the guest who has to spend a drab evening admiring them.

Now this situation is not necessary. True, a portrait is a portrait and a scenic shot is something else again. It takes skill to mix them. If you merely want to remember how Little Archibald looked in the summer of '46, for goodness sake take a picture of him. But do not try to squeeze in Lake Tahoe, Mount Rainier or the entrance to Mammoth Cave, too.

Vacation snapshots can take advantage of natural surroundings, as is shown here by the pose in front of a graceful clump of sea oats.

Scenic shots, like this rocky stream in the Great Smokies, are satisfying and complete without any human figures in them. Too often vacation shots are so crowded with people that the scenery does not have a chance.

But the situation is not hopeless. The human figure can be combined with scenery in an artistic and pleasing manner. Magazines are full of such shots. Study them a while and then try to use the same technique.

If you must take Annabelle's picture on the edge of the Grand Canyon, pose her so that she fits into the landscape—get far enough away so there is room for the scenery to show. Shoot down on her, if you can, so the breathtaking depths of the great chasm will show, too.

Let Archibald be off to one side in that Lake Tahoe picture. Use Cousin Barney's six-foot-two as a measuring stick to show just how tall one of those Arizona barrel cactus plants can grow. The human figure makes a good yardstick. Group your beach scenes so that the graceful sea oats, the palm trees or the water-worn rocks have a chance, too.

In other words, pose your snapshots and take some pains with them. Do not just "stand 'em up and shoot" regardless of how they look or what scenic wonder they obscure. Last of all, do not be afraid to take an occasional picture of just scenery alone, without any assorted relatives in it. These pictures will help bring back summer pleasures as surely as shots of "the gang."

While we are on the subject, use some originality. If we had a dime for every "Aunt So-and-So picking oranges" picture that will be snapped in Florida this coming winter, we could retire and do some traveling, too.

EXPOSURE AIDES

Another trouble with vacation snapshots is their fuzziness, indistinctness and generally poor visibility. These can result from faulty techniques, from motion either on the part of the subject or the photographer, over exposure, under exposure, or poor camera equipment.

Of course, it takes a really good camera and lens to make uniformly excellent pictures under highly adverse conditions. But many people get good results with ordinary medium-priced cameras, too. It just takes care, study and the addition of a little inexpensive equipment here and there. It does not cost a cent to stand still while you take a picture—and maybe you can persuade your subject to remain motionless for the necessary fraction of a second, too. If your lens is fast enough, you can stop him, anyhow.

In line with the above statement about inexpensive equipment, the Eastman Kodak Company recently has issued a new

snapsot Kodaguide to help people who have trouble in getting the right exposure. The guide, a small celluloid folder which fits easily in a pocket, has two dials—one for outdoor pictures and one for indoor shots where photoflood lamps are used. Simple, illustrated explanations help clear up problems, and the guide provides specific answers to questions pertaining to lens and shutter settings, both for color and for black and white film. It costs twenty cents.

The Weston Electrical Instrument Corporation, too, has guides of this sort, keyed to their exposure meters. A pocket-size folder gives film ratings for all makes and speeds, both in daylight and under photoflood lamps. Accompanying this is a small booklet explaining the use of the meter itself, so that even a rank beginner can puzzle out the proper timing to give his picture. Of course, it is a rather slow job at first, but it does not take long to "catch on." Good, clear, recognizable pictures are worth a little effort. Cost of the two Weston aides totals a quarter.

ATTRACTIVE ALBUM

While we are on the subject of snapshots and albums, we want to mention the group known as the Phillips "Book-Shelf" albums made by Edwin M. Phillips & Co., 76 Woodland Avenue, East Orange, N. J. The loose-leaf volumes have a kidgrain leather finish and will accommodate about five hundred contact size prints. Special models are made for either 5 x 7 or 8 x 10 prints which can be mounted flat or displayed in acetate envelopes. The albums will look good alongside the Nature Magazine binders on the table or in the bookcase.

BRADY BIOGRAPHY

Since we made special mention of that famous Civil War photographer, Mathew B. Brady, in our opening instalment of "Camera Trails," we are interested in the publication of a complete new book about him. Its title is "*Mr. Lincoln's Camera Man.*" The book, written by Roy Meredith and published by Charles Scribner's Sons, includes four hundred of Brady's photographs, some of them previously unpublished, and is the first full length biography ever written of this father of modern spot news photography. We had to hunt some time before finding much about Mr. Brady, so we are glad to know that someone has finally gotten around to writing him up as he deserves.

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LIGHTNING—FROM MYTH TO METEOROLOGY

(Continued from page 352)

earth. (See page 360.)

Airplane pilots, who venture directly into the realm of thunderclouds and storms, are always warned to avoid the anvil-shaped cumulonimbus clouds that mean thunderstorms. Five hazards to safe flight—hail, lightning, turbulence, icing and squall winds—are to be found in thunderstorms.

Our larger planes can and have survived all these hazards. Metal planes may be struck by lightning and the passengers feel no marked effects, but pilots of wood or fabric planes are advised to give thunderstorms a wide berth.

A great deal has yet to be learned about aviation in relation to thunderstorms. To this end, the Army Air Forces this summer are conducting intensive tests in the area around Orlando, Florida, using ten especially equipped P-61 "Black Widow" night fighter planes. In addition to collecting instrumental and photographic observations relating to cloud forms, cloud height, agitation, precipitation, lightning and temperatures, the planes also will test radar equipment for use in weather scouting.

Lightning kills about five hundred people and injures some 1800 a year in the United States—small figures in comparison to the annual highway accident toll. It does about $12,000,000 worth of damage to farm buildings, causes more than half of all oil tank fires, and about 12,000 or seven per cent of all forest fires a year.

Although no one can tell when or where lightning will strike, there are certain places that are safer than others during a thunderstorm. These are: inside buildings, the bigger the better; inside a closed automobile with a steel body; in the center of a room; in a valley or a dense wood. Places to avoid are: golf courses, beaches or open spaces; hilltops, attics, under isolated trees, poles or masts; exposed machinery such as a tractor; wire fences and metal objects, stoves, pipes, chimneys and fireplaces.

Most fire losses from lightning occur in rural regions where fire-fighting equipment is not readily obtainable, and where buildings are more isolated. In cities each building seems to help protect its neighbors, while skyscrapers extend their protection over considerable areas. As for the value of properly installed lightning rods—the United States Bureau of Standards estimates that the chances of an unrodded farm building being struck by lightning are fifty-seven times greater than that of a rodded building.

But, considering the vast number of thunderstorms that rage across the face of the earth each year, lightning does comparatively little damage.

On the credit side of the ledger is a considerable contribution, for lightning liberates vast quantities of nitrogen compounds from the air and makes them available as fertilizer in the soil. It is estimated that some 100,000,000 tons of nitrogen compounds are released each year by lightning.

Man has learned many things about thunder and lightning. He has taken them from the realm of the gods and given them to the electrician and the meteorologist. He has estimated the good and harm they do annually. He has learned, in a measure, how to protect himself and his possessions from them. But still the lightning flashes and the thunder rolls, free and unharnessed by mankind. And in this latter fact can be found slim comfort for astraphobia and keraunophobia sufferers.

PLANT REFUGEES

(Continued from page 372)

in coastal central California. The wild blue species geranium, *G. pratense,* from English country lanes, may have all the room it wants and seed itself wherever it chooses. In and alongside the steps I will allow harmless, large-flowered African *Oxalis variabilis,* both pink and white, to fill the crevices and edge the stones, and I will be certain to include one of our prettiest and longest-blooming escapes, Australian bluebell, an evergreen, semi-climbing shrub, *Sollya heterophylla,* which adorns some of the Monterey pine woods with small shiny foliage and flower bells of the purest blue.

In a garden composed of flower fugitives, the adventives and not the aggressive intruders should be encouraged. Such uncontrollable trespassers as the St. John's wort, called Klamath weed, *Hypericum perforatum,* must be kept out, even though you allow the larger-flowered *H. moserianum* to bring its golden stamen-filled blossoms inside the garden gate. Many years ago, Klamath weed, hailing from Europe, became a scourge in Oregon and swept southward and eastward with such force that it has reached plague proportions. Another pest to keep at bay is blue-flowered European periwinkle—myrtle to some—, *Vinca major,* pretty enough under the oaks and maples of Pennsylvanian woods, and along the rambling fences, but a horrible swallower of choice natives. A white-flowered morning glory, also European, *Convolvulus arvensis,* is now proving that those farmers who first sent up the battle-cry were no alarmists, for its creeping roots are the bane of many an orchardist and gardener.

In the West three slippery shrubs threaten danger. These rascals are Scotch broom, Spanish broom and gorse. When one comes across mountain slopes where the European broom has eloped with blue-blossomed wild lilac, *Ceanothus,* or cemeteries that would be flowerless without its bright yellow blooms, or untidy lots made gay by its presence, it is easy enough to weaken. But, by and by, there will be no wild lilac, the cemeteries will be nothing but gravestones and broom, and the shrubs in the lot will slip under the adjoining gate. Acres of land have been absorbed by this trio of immigrants.

I get quite bowled over when suddenly I come across some unexpected flower interlopers, cannas and orange flare cosmos in Louisiana, growing close to bald cypress trees dripping with Spanish moss; hollyhocks, in Utah, healthy and absolutely rustless, rising from billowy white masses of Queen Anne's lace, the slanting sunlight shining through their rose or shell pink saucers. In the Gulf States I am startled at mid-afternoon by bright colonies of four-o'clocks. I am caught off guard by golden glow edging eastern meadows, and, in Pennsylvania, by a blue sea of grape hyacinth. Single daffies confront me in Virginia, double daffies in Maryland, *Narcissus biflorus* in North Carolina, and tall watsonias in California. Johnny-jump-ups, like the ones that grew in my grandmother's English garden, peer at me from the nurserymen's rows in New Jersey—where they are decidedly unwelcome—and I am taken aback to find that endearing European buttercup, *Ranunculus ficaria,* shyly making its way toward a Pennsylvanian meadow of our own forceful buttercups. But I have yet to get on the spot early enough in the season to be shocked by that acre of tulips that has run away in Idaho.

Prodigal Star of Bethlehem, a Mediterranean, asks re-admission to the eastern garden and calla lily to the western, and wherever we live we can fall back on a reliable group of foreign plants that has proved that it is self-sufficient and can carry on alone in the domain of the overbusy gardener. In whatever State we are operating, under whatever conditions, these aliens can be pressed into service, for they have earned their citizenships. A great many introduced plants require the tender care we give our pampered darlings, but these inured outsiders ask for little and give much.

A Book of Poems

Middle Border Year. By Wayne G. Delavan. Bronson, Kansas. 1946. Osage Press. 30 pages. Illustrated with woodcuts. $1.00.

The author dedicates this little booklet of verse to "Mom and Dad, who taught me to enjoy life." That their teachings were successful is evident from the verse that Mr. Delavan has gathered between the covers of the booklet. He loves the outdoors.

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8. *Non-specific phrases barred:* Phrases such as "highest" or "top prices paid", as well as any other so-called "auction-type" phrases are not acceptable. The terms "fair price paid" or "state price wanted" may be used.

9. *Blind ads not acceptable:* Box number or blind ads will not be accepted. Give your complete name and address to insure prompt delivery of all mail or telegraph replies.

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11. The association will not accept for publication in NATURE MAGAZINE, advertisements of firearms, ammunition, or patent medicines.

12. *Responsibility for illegible copy:* Type or print advertisement plainly as we cannot be responsible for errors due to illegible writing.

13. *Closing date:* The closing date of all advertisements is the 20th of the second month preceding month of issue.

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BOOKS

BIRDS AND FERNS of El Paso, on Mexican Border. Birds, $1.00, Thirteen Ferns, 75 cents; 56 pages, illustrated. Elsie McElroy Slater, 516 Prospect Avenue, El Paso, Texas.

CACTUS JOURNAL, six months $1.00. Epiphyllum Handbook, 180 illustrations, 10 color plates, $3.65. Abbey Press, Box 101, Pasadena, California.

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G.I. BIRD STUDY

(Continued from page 359)

arrived, Dick must have been somewhat puzzled; the censor had neatly snipped out every Latin word. I often wonder what vital military secret the censor imagined I was trying to disclose.

As the situation around Naples became more stable and spring came on, I began to see several new species. There were the white and yellow wagtails, slim, waterside birds with a graceful bobbing walk that earns them the Italian name of *Ballerina*. In parks and suburban areas the chaffinch, handsomely marked with blue-gray, chestnut, pink, olive, and white, seemed quite common. The kestrel was there, and around the blue bay there were gulls, especially large migratory flocks of a gull resembling Bonaparte's.

During this early period in Italy we were being subjected to frequent air attacks, and as others have noted, the birds seemed little affected by the deafening show. As dawn broke after some of our worst raids, the blackbird would be singing as heartily as ever, despite the fact that part of his domain might have been blasted by German high explosives. The enemy would occasionally send an observation plane over in daylight, so high that only a vapor-trail marked its position. The heavy anti-aircraft would cut loose with shattering suddenness from dozens of guns, but the tiny green finches in a nearby pine would chatter on interminably, the wagtail would not lose a step in his promenade, and the swifts and swallows would not hesitate in flight. Later during the war I saw a P-47 fighter plane explode and burn on the Pisa airport, while a flock of lapwings alighted nearby and made their dignified way about the area, oblivious to the hubbub of the fire-fighters, and, of course, unaware of the danger of the 500-pound bombs on each wing, against which the flames licked hungrily before being extinguished.

In the matter of avian singers, traditionally musical Italy was less than bountiful. Beside the blackbird, there was a new species, the blackcap, one of the Old World warblers related to our kinglets. It drew this comment: "The best singer so far in Italy. Tone very much like the flight song of the ovenbird; loud and intense short phrases with occasional squeaky notes like the catbird, but not harsh at any time." A Swiss book says, "*Gesang: sehr gut . . . laut und rein.*" I never saw or heard the nightingale, nor any of the thrushes, so the blackcap remained my choice—with, of course, the skylark.

The quality of the skylark's song seemed to improve between Morocco and Italy, although never reaching the expectations created by Shelley's "unbodied joy", or Wordsworth's "ethereal minstrel." The North African bird was apparently not the true English skylark; Martorelli gave me the comforting information that the probable species, *Galerida cristata*, in North Africa is noted for wide variation "*di tinte e di proporzioni.*" But there were further complications—the lark I saw and heard in Italy was apparently not quite the bird of the poets, being a subspecies, *cantarella*, of the English *Alauda arvensis*. So perhaps I have yet to hear and fully appreciate the real, indubitably genuine skylark.

My last birding in Europe was during an Army-sponsored tour of Switzerland. The first half-hour of travel in this unique little land made it plain how fortunate the Swiss were to have preserved so well their soil, their forests, and their freedom from the talons of war. For the first time in nearly three years I was in a country with an abundance of flowing water, with a countryside green from the valleys up through the forests to timberline, and free from the threat of land mines. And for the first time I was able to buy a well-executed, inexpensive field book—Guggisberg's *Vögel der Schweiz* in two small volumes, containing 255 species illustrated in color. Of course, to add to my linguistic confusion, the names and text were in German, with French and Latin names in the index. I could now point to my black-capped little singer and say confidently, "Yes, *La Capinera, Sylvia atricapilla*, that is *Mönchsgrasmücke*, or, if you prefer, *Fauvette à tête noire.*" Not until months later did I discover it was known by the simple name of blackcap.

Three incidents stand out particularly from the Swiss tour. At the town of Braunwald I was walking along an evergreen-shaded trail when I heard a mixed flock of small birds high in the trees. I tried an old American trick of squeaking by "kissing" a knuckle of the clenched fist. And these Switzers proved just as gullible as any Americans I ever saw, plummeting down to scold and peer just a few feet away—birds that looked to me like two varieties of chickadee, a "bridled" titmouse, a nuthatch, and a kinglet.

At the Alpine resort of Davos I decided rather foolishly to climb an Alp, but it was only after struggling to the very summit that I found two extraordinary birds. One species was small and mostly white; when flying these birds look like animated, black-marked patches of snow, and in German the name is *Schneefink*. Drifting in a scattered flock up from the mist-obscured valley, the companion bird (called Alpine chough in English) was far different; big, ragged-winged, and all black except for red legs and a yellow bill. Like tatters of black cloth these birds were lifted almost effortlessly on the updraft, to reach the summit and settle with a few hoarse notes on the crags. There in the cold wind and driving mist they sat motionless as hunched black gargoyles, while the snowfinches called and flew about them.

Just before leaving Switzerland I was cycling beside a stream, and noticed a dark bird that flew rapidly over the water to alight at the edge of a small mill dam. There was something about his impudent short tail, white shirt-front, and a touch of white around the eye that gave the bird a slightly daft appearance—a look thoroughly justified by its subsequent actions. It went stepping along the water's edge like any normal sort of bird, but suddenly decided to walk down into the pool, deeper and deeper, over its head and out of sight—emerging just as nonchalantly many seconds later and ten feet farther along the shore. I laughed aloud and startled the creature. I was not used to the strange actions of the European water ouzel, nor he to the guffaws of an astonished American soldier.

From Switzerland I returned to Naples and before many days had passed I was aboard a transport going home. My resolutions were of the best; I was going to ornithologize all the way across the Atlantic, but in the midst of identifying a jaeger beyond Gibraltar I was seized by a subtle sensation connected with the pitch and roll of the ship, and my bird study was thenceforth much curtailed. I think I recall seeing a gannet among the gulls as we came into New York bay. But, as dusk came down that winter day, we landed on the native shore. There was a smoky red sunset behind the black fringe of trees, and a string of crows flew across the scene cawing their honest caw. Never was there a view so good to see, nor a sound so good to hear.

A BICENTENNIAL MEMORIAL

(Continued from page 374)

everyone to dream of what it would be like to drive from coast to coast along highways everywhere beautiful, always varied; to take the family for a picnic, not where there *used to be* a beautiful grove, but where there *is* one; to hike along trails through forests and up mountains unscarred by slash, fire, or unsightly building; to be able to take a boat ride in any of the streams, lakes or bays of America and find them clean; to be able to discover in their proper habitats one's favorite birds, mammals and plants to live always in the beautiful, inspiring surrounding that this country's superb natural heritage makes possible!

Let us, the people of the United States, work to accomplish all of these programs, that all the land may be beautiful; that it may stand, from coast to coast and from border to border, as the most fitting memorial to the two hundredth anniversary of the United States of America.

About Many Things

A Book about a Thousand Things. By George Stimpson. New York. 1946. Harper and Brothers. 552 pages. $3.50.

This is the latest in the now imposing collection of Stimpson question and answer books, and maintains the high standard that this able, conscientious and inquiring Washington newspaperman has set with his earlier works. The author calls this volume "the fruit of curiosity." He gathered the material for it in the process of satisfying his curiosity about such things as why ducks do not get wet, what Nova Scotia means, what is sheet lightning, and some nine hundred and ninety-seven other questions. All of the questions are answered thoroughly and interestingly, and the author's researches have been carefully and thoroughly done. One cannot pick a flaw in his answers to the many Nature questions posed within the pages of this book. And the excellent index makes it a valuable reference book, which, while covering a wide range of subjects, may very well contain information one has been seeking. Like the other books by Mr. Stimpson, it is fun to pick it up in a few spare moments and read a few of the paragraphs. —R. W. W.

Corrections

Kind readers have called our attention to two recent slips in the magazine. The one we feel worst about was Richard W. Dexter's brief item in the May issue concerning a captive tarantula. Mr. Dexter had the genus properly identified as *Eusypelma,* but the linotype operator punched an *r* instead of an *s,* and it slipped by us. We apologize to our readers, and Mr. Dexter. The other matter is not precisely an error. In the quiz on "hybrid" plant names in May it was inferred that the basswood takes part of its name from the fish we know as the bass. G. G. Nearing calls to our attention the fact that the bass part of basswood comes from bass, or bast, used from way back as a fiber. A mat made from this fiber may also be called a bass. This fiber is still used to some extent in northern Europe. So basswood is still a hybrid name.

Hoosier Naturalists

With the opening of the 1946 season a corps of twelve naturalists took over duties in seven of Indiana's State Parks, carrying on a policy established in 1923. The naturalist service in Indiana has served more than 800,000 people, and more than 300,000 have visited the Nature museums at Turkey Run and McCormick's Creek parks. A wide variety of services is offered by the naturalists, from pet shows to research projects. Sidney R. Esten of Indianapolis is chief naturalist.

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Under the Microscope

By JULIAN D. CORRINGTON

SCIENTIFIC NAMES

"A name that baffles, frights, and shocks us—
"Ornithorhynchus paradoxus."
—Oliver Herford.

NOMENCLATURE, in itself a fascinating study, has intrigued some people and "baffled and shocked" others through all the ages. Juliet asked the famous sixty-four-dollar question, "What's in a name?" and decided that a rose would smell as sweetly if called by some other moniker. Names are not things, to be sure; they are the handles by which we grasp things, and so we must have them or remain speechless. The very word "name" stems from the same source as "noun," the Latin *nomen*.

Nouns constitute the basic language. They are the first sounds learned in infancy and man may make his simpler wants known in a foreign country if he can utter a few nouns. We absolutely must have a name for everything we wish to talk or write about. Who has not experienced the clumsy fumbling about, in seeking for an unknown or forgotten name, with such moronic expressions as "thingum-a-jig" or "hootenany?"

Scientific names suffer popularly from employing Latin or Greek, but gain in being more precise, as a rule, than common names. The student of biology early learns that the vernacular names of animals and plants are local, ambiguous, and non-specific. For example, take the names of several kinds of well-known game birds—bobwhite, quail, partridge, grouse—exactly what sort of bird does each of these sounds bring to your mind? Much depends on where you are from! A "partridge" is a ruffed grouse to the New Englander, a bobwhite to the Georgian, a mountain quail to the gentleman from Colorado, a "true" or European type of partridge to the British sportsman, several entirely different species when he goes shooting in India, a tinamou in South America, and a hemipode in Australia, while in non-English-speaking countries the word has no meaning at all until translated, and there are not always exact equivalents.

Let us suppose a big-game hunter from London talking with an American sportsman during an Atlantic crossing.

"I'm looking forward to some good elk shooting in Maine this fall," remarks the Englishman.

"You'll have to go some to find any elk in Maine; Montana would be more like it," the New Yorker smiles at the ignorance of these foreigners, but he is equally guilty in not knowing that the animal dubbed moose in America is the elk of Eurasia.

In the ensuing argument there would be much discussion as to the exact meaning of the words elk, moose, deer, stag, and still other terms, with the conclusion that they were about as exact as bass and trout, pike and pickerel, among anglers. The generalization here is that different animals are known by the same name in different regions.

The opposite is equally true; the same animal is known by different names in different sections. A familiar instance is that of a large and common woodpecker of the United States. In various localities, this bird is called the flicker, yellowhammer, high-hole, golden-winged woodpecker, yarup, wilcrissen, and so on to a total of more than ninety recorded names.

Ambiguity is bad enough; anonymity is worse. There are some twenty-odd species and varieties of garter snakes in the United States, but they are all lumped as "garter snakes" by the average naturalist. Some twenty varieties of song sparrows likewise occur within our borders. These cases and a great many others like them deal with familiar animals; the matter is greatly exaggerated when we begin to include the hordes of insects, worms, jellyfish, to say nothing of the protozoa, and, in the botanical field, the immense assemblages of flowering plants, the confusing ferns and mosses, and finally the vast groups of algae and fungi, especially the bacteria.

It is said that there are more species of beetles in the United States alone than there are stars visible on a clear night; to give them all common names would tax the resourcefulness of even the people who name Pullman cars or race horses! Every farmer or horticulturist knows a few of the commoner pests among beetles, but not even the average entomologist can identify very many of those collected in a day's work in the field. It takes an expert with this single group—a coleopterist—to know beetles, and a single human life span is not enough to learn them all.

The need for a universal language, still another objection to common names, is well illustrated by a story Peattie tells in his *Green Laurels*. He was endeavoring in vain to convey to a German botanist the delights of cranberry sauce. At length, being a botanist himself, Peattie tried the language of science. "Ach, so? Ja! *Vaccinium!*" enthused the German. One might argue that it should be as easy to translate the difference between the names of the striped cucumber beetle and the spotted cucumber beetle into Japanese or Swedish as any other phrases, forgetting that each language has its own peculiar forms and idioms that, if literally translated, make no sense in another tongue. How could one handle a name like Red Admiral, a common American and European species of butterfly? The French call this type *vanesse*, which does not mean "admiral" (French, *amiral*) at all. "*Amiral rouge*" would call up to the French mind a humorous caricature of a bibulous, red-faced naval officer, not a butterfly!

By contrast, scientific names are exact, specific, and universal. They are used for these reasons, and not merely to seem erudite, as the unthinking have sometimes supposed. The same person who smiles derisively and condescendingly when the local entomologist "puts on dog" by calling a common old potato bug *Leptinotarsa decemlineata*, and explains that it is a beetle and not a bug, fails to realize that he, too, uses scientific names unwittingly. He goes to the circus sideshow and tells others later of the huge *Boa constrictor* there exhibited, or he describes his garden pets as *Amaryllis* or *Delphinium* without blinking an eyelash. These are simply examples of cases where the technical names have come into general use because there were no common equivalents or because they were better. Botanical names are far more familiar to the general public than the zoological. This same man also understands full well such scientific designations as appendicitis, plasma, and penicillin. A few moments conversation with him, in the following vein, would no doubt quickly convince him that scientific binomials for animal and plant species are absolutely necessary in serious circles.

Investigations in cytology discover the peculiar fact that a certain roundworm parasite of the horse has but four chromosomes in its body cells. This unprecedentedly low number has made it possible to follow the career of each chromosome separately, thereby unraveling important chapters in heredity and development, the role of these minute objects being applicable alike to all organisms, including man. Thus *Ascaris megalocephala* became one of the scientifically most famous creatures, while its close relative, *Ascaris lumbricoides*, from the pig, was useless for this study, since it had forty-eight chromosomes, a number so large that individual units are well nigh impossible to trace. Later, parasitologists discovered that this dangerous intestinal predator, which also infests man, exists as two species that cannot be differentiated structurally, but react in quite unlike manners to cultural and serological tests. The specific name, *lumbricoides*, was assigned to the human parasite, while the

worm from the pig is now called *Ascaris suilla*. It is highly important, then, in the sciences of genetics, embryology, medicine, and public health, to be able to designate these worms exactly, with no possibility of misunderstanding among scientists in different fields or speaking different languages.

Similar examples are as numerous as the investigations themselves. We must know exactly just what species of fungi produce penicillin and which do not; it is imperative to understand which species of fleas, from what species of rats or other rodents, transmit plague; which lice are vectors of typhus; which species of the Solanaceae are edible, as the potato and tomato, and which are poisonous, as belladonna and henbane.

The famous Linnaean system of binomials employs two names for every organism, sometimes three to distinguish subspecies. The first is the genus, an inclusive group of related organisms, the second the species, an individual kind of organism. By international ruling, the name of the genus is always capitalized. It must be a noun, from Latin, or the Latinized form of a word from another language. The specific name is an adjective, which must agree with the noun it qualifies. In zoology, this name is always written with a small initial letter, whether from a proper noun or not; in botany, it is capitalized if from a proper noun.

Usually the scientific name describes certain conspicuous features of the organism. Thus *Ornithorhynchus*, the generic name for the duckbill or platypus, mentioned in the couplet with which this article began, is the Latinized form of two Greek words meaning bird-beak. *Pithecanthropus erectus* indicates the ape-man who walked erect; *Mimus polyglottos* is the mockingbird, the many-tongued mimic. Often the specific name designates the region where the creature was first observed, or the range or habitat where it may be found, as *ludovicianus* for Louisiana, *palustris* for marsh-dwelling. Many times either or both of the names may be commemorative, honoring persons whose work is identified with the group concerned: *Wilsonia*, a genus of warblers, after Alexander Wilson, famous pioneer American ornithologist; *Storeria dekayi*, a small snake, after Storer and DeKay, two of our early naturalists.

The task of learning a scientific vocabulary seems enormous at first. Most people are inclined to agree with *Casca* who, in reporting a speech of *Cicero's*, stated "—those that understood him smiled at one another, and shook their heads; but, for mine own part, it was Greek to me." (*Julius Caesar*, I, 2.) The best plan, we believe, is to acquire the use of scientific names and terms slowly, and by dint of repetition, and never, never use or learn one without understanding its etymology. Thus, one learns that *maculo*—is a combining form signifying spotted, *acantho*—indicates horns or spines; *cephale* designates the head, *gaster* the belly. So, with these terms added to one's vocabulary, if the name *Acanthocephala maculogaster* should be encountered, it would be evident at once that this formidable mouthful was merely a precise and shorthand expression for a spiny-headed animal with a spotted belly, certainly a simpler way of putting it than the English. Before long one learns several dozens of prefixes, roots, and suffixes, and then begins to feel more at home in this *terra incognita*.

The Greeks and Romans had names for all of the conspicuous and well-known animals, as *Felis* for cat, *Homo* for man. Linnaeus employed these original roots, wherever they existed, as his generic names, and added a descriptive specific name, as *Canis familiaris* for the domesticated dog. Subsequent expansion of the known world, and intensification of field work, with the addition too of microörganisms and fossils, have multiplied the species known to the ancients many thousandfold, so the majority of generic nouns have had to be devised. Although Latinized—the New Latin of the dictionary—these names have been taken from all languages, a fact not generally understood. Some examples of derivation will conclude this discussion of names:

Greek: *Dermestes* (larder beetle), Amphibia.

Latin: *Homo sapiens*, man; *Equus caballus*, horse.

Combinations: Echino/dermata, L/G; Ophi/ur/oidea, L/G/G; *Setophaga ruticilla*, the Redstart, G/L.

Classical mythology: *Hydra, Medusa, Nereis.*

Latinized proper nouns: *Nuttallornis, auduboni, americanus, carolina.*

Sanskrit: naga, snake, gives *Naja*, the genus of cobras; dram, to run, gives dromedary.

Hebrew: gamal becomes camel. *Camelus dromedarius* is thus Hebrew plus Sanskrit.

Arabic, through Latin, *Alhagi*, a genus of desert plants; through Spanish, *Algaroba*, the carobs, a plant genus; through French, zurafah (Arabic), girafe (French), giraffe (English, *Giraffa* (Latinized technical name of genus). Arabic and Persian qirmiz becomes French and English kermes, giving scientific generic name of scale insects, *Kermes.*

French: *Grampus griseus*, a whale; *Grison*, a badger.

Spanish: el lagarto (the lizard), from Latin lacerta, lizard, gives *Alligator* which is both technical and common

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name of genus.

Italian: belladonna, as in *Atropa belladonna*, the nightshade.

Portuguese: alcatraz gives English albatross, or scientific *albatrus*.

Icelandic: alka gives technical *Alca* or English auk.

German: *Molge*, a genus of salamanders, comes from German molch, a salamander; *Typhlomolge*, another genus, is Greek plus German.

Amerindian: the Algonquian makasin, gives specific name of the Water Moccasin, *Agkistrodon mokasen*; Ojibwa maskinonje gives specific name of *Esox masquinongy*, the Muskallunge.

Peruvian: the vernacular terms Llama, Alpaca, and Guanaco, all South American types of the camel family are derived from the same terms as the zoological name, *Lama huanocos*.

Mongol: argali, a kind of mountain sheep, gives the specific name of Ovis *argali*.

Singhalese; *Nelumbo*, a genus of water lilies.

Malay: *Gecko*, typical genus of the lizard family Geckonidae, is from gekoq and is also a good example of many onomatopoeic words, in imitation of the sounds made by the animal.

African: *Okapia johnstoni*, the Okapi, is from a native name in the Belgian Congo. The Kaffir nqu gives the generic *Gnu; kudu* is from the Hottentot.

HISTORICAL OUTLINE

When bacteriology began to emerge as a distinct science, there arose two opposing schools, attempting to interpret the nature of bacteria as seen under the microscope. First in the field was the doctrine of pleomorphism (Gk., more-forms). Championed especially by Nägeli, 1877, this view, in its extreme form, held that all bacteria belong to a single species which could assume any of the shapes seen microscopically, as cocci (spheres), baccilli (rods), or spirilla (spirals). Observations of changes from one morphological type to another were not uncommon, the so-called involution forms and other bizarre and degenerate alterations being well known. Not only were bacteria considered highly variable structurally; the pleomorphists presupposed that a harmless organism could become deadly, a necessary conclusion if all were of a single species.

Reaction to this opinion arose with Koch and his development of pure cultures. The extreme of this opposing view, monomorphism, stated that each structural type of bacterium was a separate species, existing in one form only, and that the involuted specimens represented dying or dead cells. Today, the rightists, including the majority of bacteriologists, hold that each morphological exemplar constitutes a separate species, but that a certain amount of variability occurs, as with other organisms; the leftists establish fewer species and think of different structural forms as evidences of such phenomena as conjugation, sexual reproduction, life cycle stages, and the like.

Just as the malarial organism, a protozoan, may exist, at various stages of its career, as sexual gametes, asexual spores, or feeding cells, or a honey bee may be either egg, larva, pupa, adult worker, drone, or queen, so the pleomorphists among modern bacteriologists believe that certain appearances in their cultures indicate similar conditions and events. The correct view is doubtless somewhere between these two extremes.

The visible simplicity of bacteria, along with their very minute size, makes it difficult to find valid taxonomic characters. Features that may be of great importance medically, as virulence, may be of no significance at all to the bacteria themselves. Cells that look alike and seem to constitute a single species may react differently under varying culturing and inoculation experiments and thus appear physiologically as two or more distinct species. There is great diversity of opinion among specialists today, so that no one knows what sorts of characteristics are comparable biologically with the kinds employed for higher organisms, nor what items have genetic value. The result is that there is no scheme of classification beyond primary subdivisions that has been generally accepted, and "species" of bacteria are held not to be equivalent to those of higher animals or plants.

One of the first successful attempts at classifying bacteria on a morphological basis was that of Migula, in his *System der Bacterien*, 1897. While no longer used today, his schema influenced the taxonomy of this group markedly and was one of the cornerstone treatises for species naming. Orla-Jensen's Classification, of 1909, departed totally from that of Migula in being physiological, with primary groups based on methods of nutrition. Altogether, some sixty or more plans have had their day, boiling down to five or six in vogue at the present time, mostly German, the outstanding American contribution being that of Bergey. The fifth edition of Bergey's *Manual of Determinative Bacteriology* was issued in 1939. This work is the most exhaustive of any and is adhered to by the bulk of American students of the subject, though without a following abroad. The ideal natural classification of bacteria has yet to be written.

TRADE NOTES

The fourteenth revised edition of one of the best known and most comprehensive of general bacteriologies has appeared in a sumptuous postwar format, the *Textbook of Bacteriology*, by Jordan and Burrows, of the University of Chicago. This edition carries on the outstanding text of the late Professor Jordan, and has been brought completely up to date.

In addition to detailed treatment of all groups of bacteria, there are also sections on medical mycology, spirochætes, protozoa, worm groups, rickettsiae, and bacteriophage. We especially enjoyed the general chapters on morphology, physiology, heredity and variation, and classification. Still other chapters consider the bacteriology of water and sewage, milk and food, disease, infection, and immunity. All of these are interestingly written and surprisingly readable, as regards the average layman, for such technical material. The illustrations are ample and very fine, most of them new. Pp. xvii, 909; figs. 242. The W. B. Saunders Co., West Washington Square, Philadelphia 5, 1945. $7.00.

The third edition of Dr. Laurence H. Snyder's *The Principles of Heredity*, recently released, adheres to the basic plan that made the earlier issues so popular, but with rearrangements and additions that incorporate the latest researches in this important science.

For the general reader and beginner, this is our favorite text in genetics. The explanations are exceptionally clear and interesting, the exemplary material unusually well chosen, and the diagrams and illustrations splendid. The author is well known as an authority on human and medical genetics, and the book gains in general cultural significance by the inclusion of a proper amount of this material. Our only suggestion for improvement would be the addition of a chapter on the life and career of Mendel, to us a vitally interesting chronicle, of decided importance to the development of the subject.

For the specialist: the chapters on multiple factors, biometry, and selection and inbreeding have been grouped together to form a single unit on quantitative heredity; new discoveries on the Rh factors have been included; the chapters on human heredity have been brought together under the title of "The Mutant Gene in Man," and completely rewritten, with the addition of many new facts and tentative chromosome maps; a chapter, newly entitled "Eugenics," has likewise undergone revision. Pp. xvi, 450; frontisp., figs. 484, 4 in color. D. C. Heath & Co., Boston, 1946. $3.75.